OMB Number: 2030-0020
Expiration Date: 06/30/2024

Preaward Compliance Review Report for All Applicants and Recipients Requesting EPA Financial Assistance

Note: Read Instructions before completing form.

I. A. Applicant/Recipient (Name, Address, City, State, Zip Code)

Name: The Keya Foundation, Inc.

Address: 118 S. Willow Street, P.O. 1824

City: Eagle Butte

State: SD: South Dakota Zip Code: 57625-1824

B. DUNS No. 078645992

II. Is the applicant currently receiving EPA Assistance? ☐ Yes ☒ No

III. List all civil rights lawsuits and administrative complaints pending against the applicant/recipient that allege discrimination based on race, color, national origin, sex, age, or disability. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

None - Not applicable

IV. List all civil rights lawsuits and administrative complaints decided against the applicant/recipient within the last year that allege discrimination based on race, color, national origin, sex, age, or disability and enclose a copy of all decisions. Please describe all corrective actions taken. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

None - Not applicable

V. List all civil rights compliance reviews of the applicant/recipient conducted by any agency within the last two years and enclose a copy of the review and any decisions, orders, or agreements based on the review. Please describe any corrective action taken. (40 C.F.R. § 7.80(c)(3))

None - Not applicable

VI. Is the applicant requesting EPA assistance for new construction? If no, proceed to VII; if yes, answer (a) and/or (b) below.

☐ Yes ☒ No

a. If the grant is for new construction, will all new facilities or alterations to existing facilities be designed and constructed to be readily accessible to and usable by persons with disabilities? If yes, proceed to VII; if no, proceed to VI(b).

☐ Yes ☒ No

b. If the grant is for new construction and the new facilities or alterations to existing facilities will not be readily accessible to and usable by persons with disabilities, explain how a regulatory exception (40 C.F.R. 7.70) applies.

None - Not applicable

VII. Does the applicant/recipient provide initial and continuing notice that it does not discriminate on the basis of race, color, national origin, sex, age, or disability in its program or activities? (40 C.F.R 5.140 and 7.95)	☒ Yes	☐ No
a. Do the methods of notice accommodate those with impaired vision or hearing?	☒ Yes	☐ No
b. Is the notice posted in a prominent place in the applicant's offices or facilities or, for education programs and activities, in appropriate periodicals and other written communications?	☒ Yes	☐ No
c. Does the notice identify a designated civil rights coordinator?	☐ Yes	☒ No
VIII. Does the applicant/recipient maintain demographic data on the race, color, national origin, sex, age, or handicap of the population it serves? (40 C.F.R. 7.85(a))	☒ Yes	☐ No
IX. Does the applicant/recipient have a policy/procedure for providing access to services for persons with limited English proficiency? (40 C.F.R. Part 7, E.O. 13166)	☒ Yes	☐ No

X. If the applicant is an education program or activity, or has 15 or more employees, has it designated an employee to coordinate its compliance with 40 C.F.R. Parts 5 and 7? Provide the name, title, position, mailing address, e-mail address, fax number, and telephone number of the designated coordinator.

Not Applicable

XI. If the applicant is an education program or activity, or has 15 or more employees, has it adopted grievance procedures that assure the prompt and fair resolution of complaints that allege a violation of 40 C.F.R. Parts 5 and 7? Provide a legal citation or Internet Address for, or a copy of, the procedures.

Not Applicable

For the Applicant/Recipient

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law. I assure that I will fully comply with all applicable civil rights statutes and EPA regulations.

A. Signature of Authorized Official	B. Title of Authorized Official	C. Date
Tammy J Granados	Board President	03/25/2022

For the U.S. Environmental Protection Agency

I have reviewed the information provided by the applicant/recipient and hereby certify that the applicant/recipient has submitted all preaward compliance information required by 40 C.F.R. Parts 5 and 7; that based on the information submitted, this application satisfies the preaward provisions of 40 C.F.R. Parts 5 and 7; and that the applicant has given assurance that it will fully comply with all applicable civil rights statures and EPA regulations.

A. *Signature of Authorized EPA Official	B. Title of Authorized Official	C. Date

*** See Instructions**

Instructions for EPA FORM 4700-4 (Rev. 06/2014)

General. Recipients of Federal financial assistance from the U.S. Environmental Protection Agency must comply with the following statutes and regulations.
Title VI of the Civil Rights Acts of 1964 provides that no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. The Act goes on to explain that the statute shall not be construed to authorize action with respect to any employment practice of any employer, employment agency, or labor organization (except where the primary objective of the Federal financial assistance is to provide employment). Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act provides that no person in the United States shall on the ground of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under the Federal Water Pollution Control Act, as amended. Employment discrimination on the basis of sex is prohibited in all such programs or activities. Section 504 of the Rehabilitation Act of 1973 provides that no otherwise qualified individual with a disability in the United States shall solely by reason of disability be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. Employment discrimination on the basis of disability is prohibited in all such programs or activities. The Age Discrimination Act of 1975 provides that no person on the basis of age shall be excluded from participation under any program or activity receiving Federal financial assistance. Employment discrimination is not covered. Age discrimination in employment is prohibited by the Age Discrimination in Employment Act administered by the Equal Employment Opportunity Commission. Title IX of the Education Amendments of 1972 provides that no person in the United States on the basis of sex shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance. Employment discrimination on the basis of sex is prohibited in all such education programs or activities. Note: an education program or activity is not limited to only those conducted by a formal institution. 40 C.F.R. Part 5 implements Title IX of the Education Amendments of 1972. 40 C.F.R. Part 7 implements Title VI of the Civil Rights Act of 1964, Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act, and Section 504 of The Rehabilitation Act of 1973. The Executive Order 13166 (E.O. 13166) entitled; "Improving Access to Services for Persons with Limited English Proficiency" requires Federal agencies work to ensure that recipients of Federal financial assistance provide meaningful access to their LEP applicants and beneficiaries.

Items "Applicant" means any entity that files an application or unsolicited proposal or otherwise requests EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Recipient" means any entity, other than applicant, which will actually receive EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Civil rights lawsuits and administrative complaints" means any lawsuit or administrative complaint alleging discrimination on the basis of race, color, national origin, sex, age, or disability pending or decided against the applicant and/or entity which actually benefits from the grant, but excluding employment complaints not covered by 40 C.F.R. Parts 5 and 7. For example, if a city is the named applicant but the grant will actually benefit the Department of Sewage, civil rights lawsuits involving both the city and the Department of Sewage should be listed. "Civil rights compliance review" means any review assessing the applicant's and/or recipient's compliance with laws prohibiting discrimination on the basis of race, color, national origin, sex, age, or disability. Submit this form with the original and required copies of applications, requests for extensions, requests for increase of funds, etc. Updates of information are all that are required after the initial application submission. If any item is not relevant to the project for which assistance is requested, write "NA" for "Not Applicable." In the event applicant is uncertain about how to answer any questions, EPA program officials should be contacted for clarification. * Note: Signature appears in the Approval Section of the EPA Comprehensive Administrative Review For Grants/Cooperative Agreements & Continuation/Supplemental Awards form.

Other Attachment File(s)

*** Mandatory Other Attachment Filename:** 1234-Mandatory Attach_KeyaF_final.pdf

Add Mandatory Other Attachment | Delete Mandatory Other Attachment | View Mandatory Other Attachment

To add more "Other Attachment" attachments, please use the attachment buttons below.

Add Optional Other Attachment | Delete Optional Other Attachment | View Optional Other Attachment

BUDGET INFORMATION - Non-Construction Programs

OMB Number: 4040-0006
Expiration Date: 02/28/2022

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Cheyenne River Sioux Tribal community exposures to metals in the air	66.034	$	$	$ 406,482.00	$ 0.00	$ 406,482.00
2.						
3.						
4.						
5. Totals		$	$	$ 406,482.00	$ 0.00	$ 406,482.00

Standard Form 424A (Rev. 7- 97)
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SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY (1)	(2)	(3)	(4)	Total (5)
	Cheyenne River Sioux Tribal community exposures to metals in the air				
a. Personnel	$ 54,600.00	$	$	$	$ 54,600.00
b. Fringe Benefits	10,920.00				10,920.00
c. Travel	3,900.00				3,900.00
d. Equipment					
e. Supplies	26,355.00				26,355.00
f. Contractual					
g. Construction					
h. Other	273,754.00				273,754.00
i. Total Direct Charges (sum of 6a-6h)	369,529.00				$ 369,529.00
j. Indirect Charges	36,953.00				$ 36,953.00
k. TOTALS (sum of 6i and 6j)	$ 406,482.00	$	$	$	$ 406,482.00
7. Program Income	$ 0.00	$	$	$	$ 0.00

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Prescribed by OMB (Circular A -102) Page 1A

SECTION C - NON-FEDERAL RESOURCES

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e)TOTALS
8. Cheyenne River Sioux Tribal community exposures to metals in the air	$ 0.00	$ 0.00	$ 0.00	$ 0.00
9.				
10.				
11.				
12. TOTAL (sum of lines 8-11)	$ 0.00	$ 0.00	$ 0.00	$ 0.00

SECTION D - FORECASTED CASH NEEDS

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$ 142,968.00	$ 60,000.00	$ 27,656.00	$ 27,656.00	$ 27,656.00
14. Non-Federal	$				
15. TOTAL (sum of lines 13 and 14)	$ 142,968.00	$ 60,000.00	$ 27,656.00	$ 27,656.00	$ 27,656.00

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT

(a) Grant Program	FUTURE FUNDING PERIODS (YEARS) (b)First	(c) Second	(d) Third	(e) Fourth
16. Cheyenne River Sioux Tribal community exposures to metals in the air	$ 138,701.00	$ 124,813.00	$	$
17.				
18.				
19.				
20. TOTAL (sum of lines 16 - 19)	$ 138,701.00	$ 124,813.00	$	$

SECTION F - OTHER BUDGET INFORMATION

21. Direct Charges: Direct charges included 2 subawards

22. Indirect Charges: De-minimis rate of 10% is used for Indirect cost

23. Remarks:

Project Narrative File(s)

*** Mandatory Project Narrative File Filename:** 1236-Project Narrative_KeyaF_Final-2.pdf

Add Mandatory Project Narrative File | Delete Mandatory Project Narrative File | View Mandatory Project Narrative File

To add more Project Narrative File attachments, please use the attachment buttons below.

Add Optional Project Narrative File | Delete Optional Project Narrative File | View Optional Project Narrative File

OMB Number: 4040-0004
Expiration Date: 12/31/2022

Application for Federal Assistance SF-424

* 1. Type of Submission:
- [ ] Preapplication
- [x] Application
- [ ] Changed/Corrected Application

* 2. Type of Application:
- [x] New
- [ ] Continuation
- [ ] Revision

* If Revision, select appropriate letter(s):

* Other (Specify):

* 3. Date Received: 03/25/2022

4. Applicant Identifier:

5a. Federal Entity Identifier:

5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:

7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name: The Keya Foundation, Inc.

* b. Employer/Taxpayer Identification Number (EIN/TIN): 46-0879346

* c. Organizational DUNS: 0786459920000

d. Address:

* Street1: 118 S. Willow Street, P.O. Box 1824
Street2:
* City: EAGLE BUTTE
County/Parish:
* State: SD: South Dakota
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 57625-1824

e. Organizational Unit:

Department Name:

Division Name:

f. Name and contact information of person to be contacted on matters involving this application:

Prefix:
* First Name: Tammy
Middle Name:
* Last Name: Granados
Suffix:

Title:

Organizational Affiliation:

* Telephone Number: 605-218-0466
Fax Number:

* Email: ad.keyafoundation@gmail.com

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

M: Nonprofit with 501C3 IRS Status (Other than Institution of Higher Education)

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Environmental Protection Agency

11. Catalog of Federal Domestic Assistance Number:

66.034

CFDA Title:

Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act

*** 12. Funding Opportunity Number:**

EPA-OAR-OAQPS-22-01

* Title:

Enhanced Air Quality Monitoring for Communities

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Cheyenne River Sioux Tribal community exposures to metals in the air

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: SD-001 | * b. Program/Project: SD-001

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 11/01/2022 | * b. End Date: 10/31/2025

18. Estimated Funding ($):

* a. Federal	406,482.00
* b. Applicant	0.00
* c. State	0.00
* d. Local	0.00
* e. Other	0.00
* f. Program Income	0.00
* g. TOTAL	406,482.00

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on .

☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☒ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

Add Attachment | Delete Attachment | View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix:	
* First Name:	Marcia
Middle Name:	
* Last Name:	O'Leary
Suffix:	
* Title:	Board President
* Telephone Number:	(605)964-1260
Fax Number:	
* Email:	marcia.oleary@mbiri.com
* Signature of Authorized Representative:	Tammy J Granados
* Date Signed:	03/25/2022

Quality Assurance Statement

All technical procedures used to collect and analyze the air samples using the ambient monitors will be defined in protocols and will operate according to Standard Operating Procedures (SOPs). Written records will be maintained and retained in order to document all aspects of samples collection and transport. This shall include the use of bound notebooks and special forms for sample collection information. QA will be reviewed routinely to be assured that the sampled data is collected in accordance with developed QA procedures. In the field, after the data sampling period is completed for gravimetric samples, each of the samples will be detached from the sampler, the sample collection form completed and sealed from the environment prior to being securely sent to the laboratory for analysis.

Each personal sampling instrument is inspected and calibrated before the start of each study period, and the results are entered in their respective Instrument Check Sheets. This Sheet contains all the QC/QA information of the particular instrument using its serial number as an identification number and all the tracking information with columns for delivery dates, ID, dates in the laboratory, downloading of data, data entry, and technician's initials. The Sheets are stored in binders, one per instrument, which also include Daily Tracking Sheets and a copy of the Standard Operating Procedure. The Instrument Daily Tracking Sheet contains all the information pertinent to the daily operation of the instrument, e.g. operation site, filter identification numbers, flow rates, start and stop times.

The field operator (i.e., student iintern) will change the PM samples (for gravimetric samples), check the flows of all the stationery instruments, and enter all the information for all samplers in the Instrument Tracking files. For gravimetric samples, the Tracking Sheet travels with the filter samples after the end of collection, when the filters are weighed and analyzed, e.g. collection, weighing, ion chromatography. After the analyses have been completed, the Filter Tracking Sheets will be collected in a specific binder. .

Sampling Methods Requirements

The specific procedures for collecting air samples and acquiring data will be recorded in Standard Operationg Procerdures (SOPs). There will be back-up instruments available in case of instrument failure. The principal requirements are the reproducible handling of the instruments, changing the samplers and checking the flow rates.

Sample Handling and Custody Requirements

The handling of the gravimetric filter samples are recorded as per the SOPs for filters. The correct labeling and proper storage of the samples is crucial. In the laboratory, wearing appropriate protective clothing, safety glasses and gloves is mandatory. The Tekran MerPAS passive Mercury samples will follow the procedures designated by the Tekran company (see: https://www.tekran.com/files/MerPAS-Instruction-Sheet.pdf). Records of the samples collected will be maintained in the Sample Tracking Sheets.

Instrument Calibration and Frequency

The flow rates and of the active air sampling instruments are checked routinely (e.g., at the time of filter loading and collection) by the field operators before and after changing sampling. All the calibration and inspection information concerning the instrumentation is recorded in the individual Instrument Check Sheets.

Inspection/Acceptance Requirements for Supplies and Consumables

All supplies are checked for their quality and integrity as they are received. The packages of chemicals and gases are labeled with 'date received' and 'date opened' to keep the inventory up to date, and the lot numbers are recorded in the Analysis Notebooks.

Ambient Air Monitors

The ambient monitors will be calibrated before the start, and at the end, of a sampling campaign.. Annually, audits will be performed on all ambient monitoring instruments. Written records will be maintained so as to document all monitoring data collection of the ambient monitors.

Filter Weighing Facility

The pre- and post-weighing of the gravimetric filters will be performed in the weighing rooms at NYU. NYU has an operational Weighing Facility that meet the stringent filter weighing requirements of temperature and relative humidity. We use a Mettler Toledo balance (MT-5) to PRE and POST weigh the filter after they have been conditioned as per our SOP weighing protocol. The balance has a automatic weigh calibration schedule that calibrates every 10 minutes to assure minimal weight drift. In the Weigh Facility, the filters will be reconditioned to an RH of 40% and a constant temperature prior to determining the final mass weights using a Mettler-Toledo microbalance. Quality controls will include weekly filter blanks, field blanks, and spiked samples. The filter is weighed 2X and if the two weights vary by greater than 5 micrograms, a third weight will be measured. A control filter will be weighed every fifth sample. Checks of all sample weights, field blanks, and laboratory blanks will be logged in a Laboratory notebook and stored electronically.

Analytical Methods Requirements

The chemical and physical analyses of the filters will be done according to the SOPs of the specific analysis methods. The Tekran passive Mercury samples will follow the analytical procedures designated by the MerPAS company. The NYU X-Ray Fluorescence (XRF) unit is a high energy dispersive system using secondary targets for non-destructive qualitative and quantitative determinations of trace metals on particulate collected on 37mm Teflon filters. The NYU ARL QUANT'X x-ray fluorescence spectrometer (Thermo Electron) is currently calibrated for 34 elements analyzed on five secondary fluorescers. An 10-position auto sampler allows a quick throughput of samples and minimizes time spent on preparing samples. Calibration standards for elements are run during data acquisition at the beginning, middle, and end of each set. XRF QA also includes analyses of EPA particulate filter standards, filter blanks, and spike filter of known metal concentrations.

DEPARTMENT OF THE TREASURY

INTERNAL REVENUE SERVICE
P. O. BOX 2508
CINCINNATI, OH 45201

Date: JAN 25 2014

THE KEYA FOUNDATION INC
104 OLEARY RANCH RD
TIMBER LAKE, SD 57656

Employer Identification Number:
46-0879346
DLN:
17053255331023
Contact Person:
JO A CHRISTMAS ID# 31546
Contact Telephone Number:
(877) 829-5500
Accounting Period Ending:
December 31
Public Charity Status:
170(b)(1)(A)(vi)
Form 990 Required:
Yes
Effective Date of Exemption:
August 21, 2012
Contribution Deductibility:
Yes
Addendum Applies:
NO

Dear Applicant:

We are pleased to inform you that upon review of your application for tax exempt status we have determined that you are exempt from Federal income tax under section 501(c)(3) of the Internal Revenue Code. Contributions to you are deductible under section 170 of the Code. You are also qualified to receive tax deductible bequests, devises, transfers or gifts under section 2055, 2106 or 2522 of the Code. Because this letter could help resolve any questions regarding your exempt status, you should keep it in your permanent records.

Organizations exempt under section 501(c)(3) of the Code are further classified as either public charities or private foundations. We determined that you are a public charity under the Code section(s) listed in the heading of this letter.

Please see enclosed Publication 4221-PC, Compliance Guide for 501(c)(3) Public Charities, for some helpful information about your responsibilities as an exempt organization.

Sincerely,

Director, Exempt Organizations

Enclosure: Publication 4221-PC

Letter 947

Community-based Organization Set-Aside Document

The Keya Foundation, Inc. is located in Eagle Butte on the Cheyenne River Sioux Tribe (CRST) Reservation. The foundation was founded in 2013 and received 501 (c) (3) status on January 25, 2014. "Keya" is Lakota for turtle. It is an important symbol in the Lakota tribal community. The spirit of the Keya represents the guardian of life, longevity, and fortitude.

The foundation's mission is to build organizational partnerships with underserved communities to provide knowledge, cultural renewal, and social health to individuals and families, which will ensure a future of endurance, longevity, and protection for the people in the community. As stated on the foundation's website; https://www.keyafoundation.org/about; the foundation is governed by community members of the Cheyenne River Sioux Reservation and the vision of the foundation is to build capacity within the Cheyenne River Sioux Tribal communities.

The current Board of Directors are:

1- Board President: Marcia O'Leary, a Registered Nurse and a community member of the Cheyenne River Sioux Reservation. Together with her husband, Tim (an enrolled Cheyenne River Sioux Tribe member), they own a research group, Missouri Breaks Industries Research Inc. (MBIRI) that is dedicated to researching pertinent health issues in rural American Indian communities and to reinvesting time and talent back into the Tribal communities through training and hiring practices.

2- Board Vice-President: Blaine O'Leary, B.S. Mr. O'Leary has a Bachelor's Degree in Range Management. He is an enrolled member of the Cheyenne River Sioux Tribe. He is the Director of Durable Medical Equipment (DME) of Missouri Breaks Industries Research Inc., a rancher, a business owner, and a Board Member of the Timber Lake Community Daycare.

3- Board Secretary/Treasurer: Alli Moran, B.A. Ms. Moran is an enrolled member of the Cheyenne River Sioux Tribe. She has a Bachelor's Degree in Indigenous Liberal Studies. She is the Paralegal for Cheyenne River Sioux Tribe. Ms. Moran is the founder of the Wakpá Wašté Scholars Alliance, an alliance that supports Cheyenne River Sioux Tribe youth in higher education. She is also an organizer of the Cheyenne River Sioux Tribe Native Vote Initiative that aims to engage voters from across the reservation to exercise their right to vote.

4- Board of Director (Member): Candace Lee, M.S. Ms. Lee is an enrolled member of the Cheyenne River Sioux Tribe. Ms. Lee is the Director/Academic Dean of the Oglala Lakota College, Cheyenne River College Center. She has a Master's Degree is Administrative Studies (Human Resource Specialization).

5- Board of Director (Member): Gina Red Bear. Ms. Red Bear is an enrolled member of the Cheyenne River Sioux Tribe. She is an artist in acrylic painting. Her paintings placed locally in the Cheyenne River Sioux Tribe (CRST) Domestic and Art Exhibit - taking the title of "Best of Show" in 2018. She is also a community organizer for a number of churches in CRST reservation.

Projects that the foundation has undertaken that have benefitted the Cheyenne River Sioux Tribe communities include:

1) Researching, Restoring and Rebuilding Our Oyate (People/Nation) for a Longer Life: A Research Symposium for Cheyenne River – annual symposium to build capacity in the community, bridge the ideological divides of western knowledge and American Indian traditions and methods of healing, increase the understanding of biomedical research in the community and youth, and bridge relationships between community members and researchers in hope that community members feel protected and have a sense of ownership of the research done in the community. This event is co-organized and supported by the University

of New Mexico Health Sciences Center Native Environmental Health Equity P50 Excellence Center Community Engagement and Dissemination Core (Co-Lead; Dr. Erdei, Co-I on this application).

2) Lakota Artistry Cooperative - to assist local Native American artists to develop their business through education, business/product development, and networking;

3) Laura's Project - to provide young families with parenting resources and materials;

4) Lakota Language Children Book Project - to revitalize and preserve the Lakota Language and culture; and

5) Dreamstarter - to support American Indian Youth to implement a project inspired by their dream.

The Keya Foundation, Inc. is an effective community-based organization serving the Cheyenne River Sioux Tribe communities.

EPA-OAR-OAQPS-22-01

References – CRST Community Air Pollution Monitoring grant

Barkjohn KK, Gantt B, Clements AL. Development and Application of a United States wide correction for PM2.5 data collected with the PurpleAir sensor. Atmos Meas Tech. 2021 Jun 22;4(6):10.5194/amt-14-4617-2021. doi: 10.5194/amt-14-4617-2021. PMID: 34504625; PMCID: PMC8422884.

Barnhart, E. Differentiating natural vs. anthropogenic mercury inputs and subsequent Se/Hg interactions and biogeochemical cycling in Bighorn Lake, Bighorn Canyon National Recreation Area, Montana and Wyoming. Presented at U.S. Geological Survey NOROCK EcoLunch and Webinar, Montana State University, Bozeman, MT, USA, 24 March 2016.

Chen LC, Maciejczyk P and Thurston G. 2021. Metals and air pollution. In: Handbook on the Toxicology of Metals: Volume I: General Considerations. 5th Edition Editors: G. Nordberg, M. Costa. Academic Press.

Connolly RE, Yu Q, Wang Z, Chen YH, Liu JZ, Collier-Oxandale A, Papapostolou V, Polidori A, Zhu Y. Long-term evaluation of a low-cost air sensor network for monitoring indoor and outdoor air quality at the community scale. Sci Total Environ. 2022 Feb 10;807(Pt 2):150797. doi: 10.1016/j.scitotenv.2021.150797. Epub 2021 Oct 6. PMID: 34626631.

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Indian Health Service (IHS). Environmental Health Services Updated Fact Sheet 2018:2018.

Kuo CC, Balakrishnan P, Gribble MO, Best LG, Goessler W, Umans JG, Navas-Acien A. The association of arsenic exposure and arsenic metabolism with all-cause, cardiovascular and cancer mortality in the Strong Heart Study. Environ Int. 2022 Jan 15;159:107029. doi: 10.1016/j.envint.2021.107029. Epub 2021 Dec 7. PMID: 34890900.

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Letters of Support

- **Bernita In The Woods, Cheyenne River Sioux Tribe Council Representative**
- **Candace K. Lee, Director/Academic Dean OLC-Cheyenne River College Center**
- **Randolph Runs After, Cheyenne River Sioux Tribe Sanitarian**
- **Marcia O'Leary, Missouri Breaks Industries Research, Inc. Director**

MNICOUJOU ITAZIPCO

SIHA SAPA OOHENUMPA

CRST Council Representative's Office
P.O. Box 590
Eagle Butte, SD 57625
Phone: 605-964-6685 Fax: 605-964-6680

March 20, 2022

Tammy Granados, Director
The Keya Foundation, Inc.
118 S. Willow Street, P.O. Box 1824,
Eagle Butte, SD 57625-1824

Dear Ms. Granados,

Re: RFA # EPA-OAR-OAQPS-22-01- Cheyenne River Sioux Tribal community exposures to metals in the air

Please accept this letter in support of your proposed Cheyenne River Sioux Tribal community exposures to metals in the air project. I understand that you intend to work with expert scientists to train local students to learn sampling techniques for collecting air pollution samples. For many years, there has been concerns on the Cheyenne River Reservation about the sources of mercury which is found in many of our community members. Our people have been disproportionately impacted by auto immune illnesses. I am encouraged that your proposal will teach local students the process for not only collecting and analyzing air samples but will also extend a network of collaborators with expert researchers from across the nation.

Wishing you every success on this important proposal. As you are aware, if this proposal is funded, there is a process through which the project is presented to the full Tribal Council for a full resolution of support for your activities. I look forward to supporting this very important project and to receiving a full report of your results.

Sincerely,

Bernita In The Woods
Tribal Council rep – District 1
Cheyenne River Sioux Tribe

OLC-Cheyenne River College Center
110 Lincoln Street – PO Box 100
Eagle Butte, South Dakota 57625-0100
Phone No.: (605) 964-8011/8010
Fax No.: (605) 964-8012

Tammy Granados, Director
The Keya Foundation, Inc.
118 S. Willow Street, P.O. Box 1824,
Eagle Butte, SD 57625-1824

March 11, 2022

Dear Ms. Granados,

Re: RFA # EPA-OAR-OAQPS-22-01- Cheyenne River Sioux Tribal community exposures to metals in the air

We fully support your application to EPA for your project entitled, "Cheyenne River Sioux Tribal community exposures in the air". We are excited that through this project, Environmental Science students at Oglala Lakota College will be trained and provided hands-on experiences to carry out the fieldwork.

This project is very beneficial to the Cheyenne River Sioux Reservation since there has not been any air pollution data generated on metal exposures originated from air pollutants here. We appreciate the opportunity for Oglala Lakota College to collaborate with renowned scientists like Drs. Judith T. Zelikoff and George D. Thurston from New York University School of Medicine, and Dr. Esther Erdei from University of New Mexico Health Sciences Center in this project. The strong science education component of this project will help build capacity and expertise in our community.

We look forward to working with you and we hope that your application will be reviewed favorably. Thank you.

Sincerely,

Candace K. Lee

Candace K. Lee, M.S.
Director/Academic Dean

Tammy Granados, Director
The Keya Foundation, Inc.
118 S. Willow Street, P.O. Box 1824,
Eagle Butte, SD 57625-1824

March 8, 2022

Dear Ms. Granados,

Re: RFA # EPA-OAR-OAQPS-22-01- Cheyenne River Sioux Tribal community exposures to metals in the air

We fully support your application to EPA for your project entitled, "Cheyenne River Sioux Tribal community exposures to metals in the air". There are many studies that have been done on the effects of air pollution in urban populations. These findings support that research is also needed to assess the health impact of air pollution exposures affecting rural communities in the US, in particular American Indian communities. Our communities have experienced an increased burden of medical illnesses. This project is very beneficial to the Cheyenne River Sioux Reservation since there has not been any air pollution data generated on metal exposures originated from air pollutants here. We applaud this project that it involves our local tribal college, and will train tribal members in epidemiology and public health methods. The strong science education component of this project will help build capacity and expertise in our community. This is also critical to the Tribal Nation, as it will directly support the Tribal EPA group.

The Keya Foundation has done great work and continues to advocate for the Cheyenne River Sioux people. Our communities have benefitted from projects that the foundation has conducted in the past, such as the Cheyenne River Sioux Research Symposium, Lakota Artistry Cooperative, Laura's Project, and the Billy Mill's Dream starter program. "Keya" is Lakota for turtle, an important symbol in the Lakota tribal community. The spirit of the Keya represents the guardian of life, longevity, and fortitude and this project is a representation of the foundation's mission.

We look forward to working with you and we wish you the best in your application. Thank you.

Sincerely,

Randolph Runs After

Randolph Runs After, MS
Tribal Sanitarian
Cheyenne River Sioux Tribe

Missouri Breaks
Industries Research, Inc.
Creating Opportunities for Health

Tammy Granados, Director
The Keya Foundation, Inc.
118 S. Willow Street, P.O. Box 1824,
Eagle Butte, SD 57625-1824

March 21, 2022

Dear Ms. Granados,

Re: RFA # EPA-OAR-OAQPS-22-01- Cheyenne River Sioux Tribal community exposures to metals in the air

On behalf of Missouri Breaks Industries Research, Inc. (MBIRI), I would like to express our firm commitment and utmost support for your application to EPA entitled "Cheyenne River Sioux Tribal community exposures to metals in the air". This partnership represents an extension of our established relationship, and we appreciate both the chance to work with you and to implement a project that will build capacity and expertise in our community. This project is crucial to the Cheyenne River Sioux Reservation because it will be the first study to collect air pollution data generated on metal exposures originated from air pollutants here. We are excited that this project involves our local tribal college and will train tribal members in epidemiology and public health methods. The strong science education component of this project will help build capacity and expertise in our community.

As a partner to you, we pledge to share our expertise in research and grant management with you. Missouri Breaks Industries Research, Inc. (MBIRI), established in 1995, is a private American Indian owned organization, which conducts research and provides health care as a durable medical equipment supplier to rural populations. MBIRI's mission is to promote clinical research that will enable communities and individuals to choose healthier lifestyles through support, involvement, and education, while networked to their rural, tribal, scientific, medical, and psychological communities. MBIRI has been involved in the Strong Heart Study (SHS) project since 1992. MBIRI has 25 years of experience in carrying out state-of-the-art research in tribal communities across the Dakotas as well as supporting projects in tribal communities involving Alaska, Arizona, New Mexico, and Oklahoma. Eighty percent of MBIRI permanent staff are enrolled tribal members. Staff members at MBIRI are also knowledgeable in the

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policies and procedures of conducting studies in the tribal community and have been able to establish trusting working relationship with the community.

MBIRI has experience in carrying out environmental health projects. Some of the projects that MBIRI has worked on include:

1- NARCH VII: Complex Metal Exposure and Immune Status on the Cheyenne River in collaboration with University of New Mexico;
2- Participatory Interventions to Reduce Arsenic in American Indian Communities in collaboration with Johns Hopkins University;
3- The Epitranscriptome as a Novel Mechanism of Arsenic-Induced Diabetes in collaboration with Columbia University;
4- Harnessing Microbial Batteries for Efficient, Sustainable Water Treatment and Recycling in Rural Areas in collaboration with also Columbia University, and
5- Promoting Smoke Free Homes in Lakota Communities in collaboration with the Black Hills Center for American Indian Health.

We are happy to partner with you in your proposal and we look forward to assisting you, as needed, in carrying out fieldwork and in disseminating the findings in the Cheyenne River Sioux communities. We wish you the best in your application and we eagerly anticipate the opportunity to continue bringing improved health opportunities to our friends, neighbors and relatives.

Sincerely,

Marcia O'Leary, Director

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Manifest for Grant Application # GRANT13580437

Grant Application XML file (total 1):

1. GrantApplication.xml. (size 24164 bytes)

Forms Included in Zip File(total 6):

1. Form ProjectNarrativeAttachments_1_2-V1.2.pdf (size 16021 bytes)

2. Form SF424_3_0-V3.0.pdf (size 24203 bytes)

3. Form SF424A-V1.0.pdf (size 23079 bytes)

4. Form EPA4700_4_3_0-V3.0.pdf (size 22807 bytes)

5. Form OtherNarrativeAttachments_1_2-V1.2.pdf (size 15998 bytes)

6. Form EPA_KeyContacts_2_0-V2.0.pdf (size 37327 bytes)

Attachments Included in Zip File (total 6):

1. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1234-Mandatory Attach_KeyaF_final.pdf application/pdf (size 347112 bytes)

2. ProjectNarrativeAttachments_1_2 ProjectNarrativeAttachments_1_2-Attachments-1237-Resumes_Project Manager_Key Personnel_final.pdf application/pdf (size 306054 bytes)

3. ProjectNarrativeAttachments_1_2 ProjectNarrativeAttachments_1_2-Attachments-1239-Partnership Letters-NYUSoM_UNMHSC.pdf application/pdf (size 4771490 bytes)

4. ProjectNarrativeAttachments_1_2 ProjectNarrativeAttachments_1_2-Attachments-1238-Project Narrative_References_Final.pdf application/pdf (size 93166 bytes)

5. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1235-Letter of Supports_KeyaF_Final.pdf application/pdf (size 1288284 bytes)

6. ProjectNarrativeAttachments_1_2 ProjectNarrativeAttachments_1_2-Attachments-1236-Project Narrative_KeyaF_Final-2.pdf application/pdf (size 1183212 bytes)

COVER PAGE

Project Title: Cheyenne River Sioux Tribal community exposures to metals in the air.

- **Applicant Information:**
  Applicant Organization: The Keya Foundation
  Address: 118 S. Willow Street, P.O. Box 1824, Eagle Butte, South Dakota 57625-1824
  Primary contact name, phone number, and e-mail address: Tammy Granados, (605) 218-0466, ad.keyafoundation@gmail.com
  Duns Number: 078645992

- **Set Aside:** Community-based organization set-aside. The Keya Foundation is located in Eagle Butte on the Cheyenne River Sioux Tribe (CRST) Reservation. The CRST Reservation consists of 4,300 square miles and covers Dewey and Ziebach counties. These two counties are in the top 15 poorest counties in the nation where 60% of the population live below or at poverty line. The total population of the reservation is approximately 8,000 people and 80% of them are American Indian.

- **Brief Description of Applicant Organization:** The Keya Foundation was founded in 2013 and received 501 (c) (3) status in 2014. The organization's mission is to build organizational partnerships with underserved communities (primarily CRST Reservation) to provide knowledge, cultural renewal, and social health to individuals and families, which will ensure a future of endurance, longevity, and protection for the people in the community. Projects of The Keya Foundation included "Laura's Project" (to provide young families with parenting resources and materials), Lakota Artistry Cooperative (to assist local Native American artists to develop their business through education, business/product development, and networking) , "Lakota Language Children Book Project" (to revitalize and preserve the Lakota Language and culture), "Dreamstarter" (to support American Indian Youth to implement a project inspired by their dream), and the Annual CRST Research Symposium (to build capacity in the community, bridge the ideological divides of western knowledge and American Indian traditions and methods of healing, increase the understanding of biomedical research in the community and youth, and bridge relationships between community members and researchers in hope that community members feel protected and have a sense of ownership of the research done in the community).

- **Project Partner(s):** New York University School of Medicine (George D. Thurston, Sc.D./ Judith T. Zelikoff, Ph.D.); University of New Mexico Health Sciences Center (Esther Erdei, Ph.D.)

- **Project Location:** Cheyenne River Sioux Reservation, South Dakota. Counties of Dewey and Ziebach, communities included are Eagle Butte (57625), Timber Lake (57656), Cherry Creek (57622).

- **Air Pollutant Scope:** Fine particulate matter ($PM_{2.5}$), vapor and particulate Mercury (Hg), and other particulate metals, including Lead (Pb), Arsenic (As), Selenium (Se), Nickel (Ni), and Cadmium (Cd)

- **Budget Summary:**

EPA Funding Requested	Total Project Cost
$406,482	**$406,482**

- **Project Period:** 11/1/2022-10/31/2025

- **Short Project Description:** The overall objective of this research is to generate current outdoor air pollution information for the Cheyenne River Sioux Tribal communities in South Dakota. The goal is to measure CRST specific ambient exposure levels to metals in the air they breathe. Measurements will include both $PM_{2.5}$ - associated metals and mercury (Hg) vapor.

RESEARCH PLAN

1. OVERALL OBJECTIVES

"*Cheyenne River Sioux Tribal community exposures to metals in the air*" is submitted to provide data to the federally-recognized Cheyenne River Sioux Tribal (CRST) communities located on Tribal Reservation Land in the State of South Dakota (EPA Region 8).The primary research goals of this project are to: 1) collect, process, and share data on exposures to ambient air metals in the Lakota Nation using a capacity-building participatory research design that locates sampling stations in and around Eagle Butte, SD, employing local, CRST Tribal member students to collect samples on a weekly basis for subsequent analysis; and 2) deliver to the Lakota community resources and valuable culturally translated information about their airborne metal levels and potential exposures that can be leveraged to promote policies addressing community risks and concerns related to air pollution, health, and quality of life.

The proposed project also aims to address the inequities experienced by this affected community by helping to support and rebuild environmental monitoring infrastructure lost due to COVID-19 pandemic. *Our proposed work offers an excellent opportunity for not only building Tribal capacity and air pollution measurements for CRST, but also linking present environmental concerns to the development of a new generation of environmentally-knowledgeable Tribal expertise.* This research, conducted through the Tribal Environmental Health Research Program, is directly relevant to USEPA's Air, Climate and Energy Research Program and air related research focused on impacts on American Indian/Alaskan Native communities (U.S. EPA, 2012a). Our research will be consistent with one of the 2011 National EPA-Tribal Science Council's National Tribal Science Priorities devoted to achieving a wide-range of contamination research.

2. RESEARCH TEAM

a. Cheyenne River Sioux Tribal (CRST) Communities

The CRST is an unincorporated Tribe consisting of several bands of the Lakota or Great Sioux Nation. The reservation consists of 1,450,644 trust acres, approximately the size of Connecticut, located in Ziebach and Dewey County in Central Eastern South Dakota. These counties are amongst the most disadvantaged in the US. The current CRST Tribal enrollment is 16,698, with approximately 11,690 people living on the SD Reservation Lands in 20 community centers, locations, and townships. Tribal health care providers were also concerned about potential health effects of metal exposures originating from > 900 abandoned hardrock mines upstream of the Cheyenne River. These efforts are challenging, due to traditional reliance of tribal food sources and fresh water fishing. Air monitoring will fill a critical gap in these metals exposure pathways, and will also provide environmental health capacity building of air pollution management, quality control, and assurance practices.

The CRST is in a unique position to study the impacts of outdoor air pollution and its implications for the Tribal environment, because of decade-long partnerships between the academic community and the tribal government and tribal leaders. The proposed study is committed to expand and continue ongoing academic partnerships that will extensively increase through education, community capacity building and dissemination, ambient air pollution research and monitoring for this underserved and environmentally-impacted community.

b. Keya Foundation and UNM HSC

The Keya Foundation is a CRST non-profit organization founded in 2013 and located in Eagle Butte, SD. Keya will carry out the overall study management of financial aspects and recruitment of local intern study participants. Their overall mission is to partner with underserved communities through education, social and physical health promotion, and cultural renewal to invest in themselves through education, their families, and their communities for a future of endurance, longevity and protection. As many Tribal and other marginalized communities communicate strongly through visual cues, Keya Foundation rigorously supports all art forms as successful communication tools across shared cultural experiences, and as such is a long-term supporter of science and art collaborations across the CRST and other Lakota/Dakota Tribes. The Foundation, also the creator and main organizer of community-based educational events, actively engaged with Dr. Erdei's (Co-I) University of New Mexico Health Sciences Center P50 Native Environmental Health Equity Center Community Engagement and Dissemination Core and the CRST Annual Tribal Research Symposium. Dr. Erdei and the CRST have been collaborating on various environmental health problems over the past 13 years, and have been awarded several NIH-funded research studies to collaborate on using community participation and educational engagement activities.

c. New York University Grossman School of Medicine (NYUGSOM)

Drs. Thurston and Zelikoff are both members of the Department of Environmental Medicine at the NYUGSOM, where significant scientific research into air quality, exposure assessment, source apportionment and health effects have been conducted over six decades. Indeed, the Department is a world leader in inhalation toxicology since its establishment in the late 1960s. Dr. Thurston is a leader in environmental epidemiology, and has led field sampling campaigns in locations across the US and internationally (e.g., in Western NJ, Connecticut, Toronto, Canada, and Cubatao, Brazil). Dr. Zelikoff, a well-recognized inhalation toxicologist and

Director of the NYUGSOM Center Community Engagement Core for over 15 years, has conducted citizen-based research with inner-city populations and Native American tribes, with a particular focus on the Ramapough Lenape Tribal Nation (northern NJ and southern NY). She partnered with the Ramapough Nation for over 9 years carrying out extensive citizen science projects in metal-contaminated exposure pathways (i.e., air, water, soil, and plants), as well as health assessments, environmental programs, and Wellness Sharing Circles to build environmental health literacy. The participation of the NYUGSOM, with its extensive scientific resources and capabilities, ensures the scientific rigor in the proposed community-participatory program.

3. APPROACH

a. Scientific Background and Significance

CRST communities, suffer from differential proximity and exposure to environmental hazards. Metals exposures are a long-time problem. More than one hundred years of hard rock mining left a complex environmental legacy of more than 160,000 abandoned mines in the Western United States. The same geographic area is home to over 600,000 Native people and large segments of Native American Tribal lands (Lewis et al., 2017; IHS 2018). The Black Hills Mountain Range and the Bighorn Basin include metal and rare element rich geological formations exploited by the extraction industry (Hoover et al. 2021), resulting in metal leeching into the water table, therefore contamination to drinking water and river sediment (Barnhart 2016; Patterson et al. 1988). Through work with Dr. Erdei (Co-I) community contamination and related health effects has been confirmed (Ong et al. 2014).

Human exposures to metals have significant adverse health impacts (Chen et al. 2021). For example, the Strong Heart Study has found significant serum cadmium (Cd), arsenic (As) and mercury (Hg) levels in Native American Indians (Kuo et al, 2022; Sobel et al, 2021; Sanchez et al, 2021; Suchy-Dicey et al, 2020; Oliver-Williams et al, 2018; Ong et al, 2014). Air pollution is thought to contribute to those internal metal doses. For example, coal-fired power plants are a major global source of toxic metals, including Hg and As (Chen et al, 2021). While the number of coal-fired power plants has declined dramatically in the US, there are still massive plants operating upwind of many Native American reservations. The 1,440 Colstrip Steam Electric Station is still operational in Montana, while the 1,320 MW Hunter plant, 1,073 Huntington plant, and 1,640 MW Intermountain coal fired plants also all still operate in Utah to the west, and often upwind of, the South Dakota Cheyenne River Sioux reservation. As a result, it is expected that air entering American Indian reservations could well contain toxic metals, unbeknownst to these vulnerable populations. Also, specific land use activities, horse riding, and ranch employment frequently reported in rural South Dakota brings Tribal members in direct contact with dust and PM exposure. However, rural-based communities that are disproportionately impacted by poor air quality often do not have access to reliable air quality data qualifying their actual exposures so that, as of yet, no examinations of air pollution and metal composition of PM mixtures have been carried out on the Cheyenne River Reservation. Thus, our collaborative and multidisciplinary team with strong community support will fill this research gap. These studies also support community data generation and creating an air pollution policy and Tribal Action Plan protecting public and community health among CRST communities. We believe that given the CRST's health and environmental concerns, and considering possibilities for positive change and interventions, community-level action on clean air will be inspired.

This proposal is supported by our preliminary data that document the need for this study, and which also document our team's proven ability to work with this community in a research venue. In Dr. Erdei's previously funded NARCHVII study (NIH/IHS/NIAID, PI: Erdei) examining metals mixtures in the CRST community, 225 CRST adults were successfully enrolled, with equal numbers of males and females (O'Donald et al., 2019). Exposure risk was based on combined questionnaires including participants' behaviors, location and geospatial analysis of proximity to metal contaminants along the river. Blood and urine samples were collected, and a profile was constructed of metal and metalloid mixtures by measuring 34 urinary and serum metals (e.g., Cd and Hg, shown Figure 1.) Even though 85% of survey participants eat fish from the Cheyenne River and its tributaries, not all the environmental risk estimation was explained by metal biomonitoring associated with dietary exposure. We postulate *that other exposure pathways, including airborne $PM_{2.5}$ associated metal mixture air pollution exposures, were missing in our characterization of common CRST exposures to metals.* Furthermore, quantile regression (QR) analysis of biomonitoring data demonstrated significant associations between total urinary Hg concentrations (log-transformed variable) and land use survey reported livestock work and handling (riding, roping, herding animals, Fig. 2). Such livelihood activities brought CRST participants in regular contact with inhaled particulate matter. These data indicate a need to characterize potential airborne $PM_{2.5}$ associated metals and vapor exposure contributions in CRST Tribal communities, as proposed here.

b. **Air Pollution Exposure Monitoring**

i. Overview

We will use a fully developed and characterized environmental monitoring platform to collect and disseminate air quality data in a culturally-literate format. The community will also be connected with experts in public health and communications design to analyze, interpret, and enhance community understanding of the data. Such findings will be translated into policy options to address community concerns related to air pollution, health, and quality of life.

Environmental monitoring platforms will be used to collect fine ambient particulate matter ($PM_{2.5}$) and Hg vapor samples to determine population exposures to ambient air metals. To provide valid and timely air quality information to the impacted community, we will use well-validated, commercially-available and calibrated technology and analytical methods will be used to collect and analyze air pollution samples.

ii. Ambient Air Sampling Approach

Guided by local community leaders' concerns, and using a community science approach, a variety of different air monitors will be deployed at three strategic locations across the reservation, and the collected samples analyzed for metals content. The types of samplers and collection durations used include: 1) monthly passive Hg vapor samples; 2) weekly gravimetric $PM_{2.5}$ samples analyzed for trace metal concentration in a manner consistent with those conducted by the US EPA in the Chemical Speciation Network (CSN); and, 3) Purple Air continuous $PM_{2.5}$ air samplers. Collectively, these three systems will provide a complementary and informative characterization of particle and vapor exposures at each monitoring location. Field sampling will be carried out by local Native American student interns trained by NYU study scientists. The Oglala Lakota College environmental associate degree program students, who will serve to deploy the monitoring devices, are primarily from CRST and internship opportunities by Keya Foundation will be focused on CRST student development (see LOS from OLC). Samplers will be retained by the community for their own use in the future.

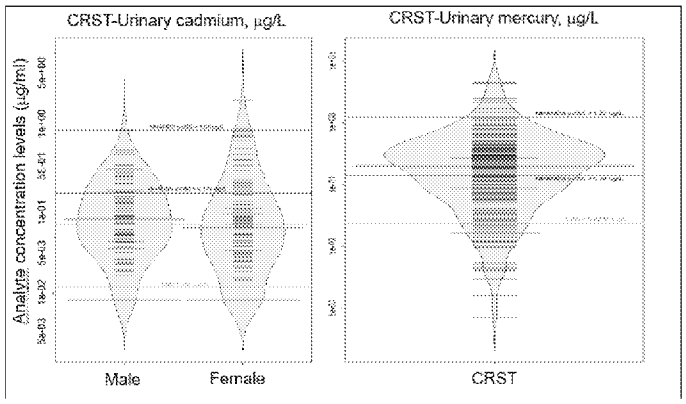

Figure 1. Violin Plots of Cadmium and Mercury Urinary Metal Excretion among CRST Participants.

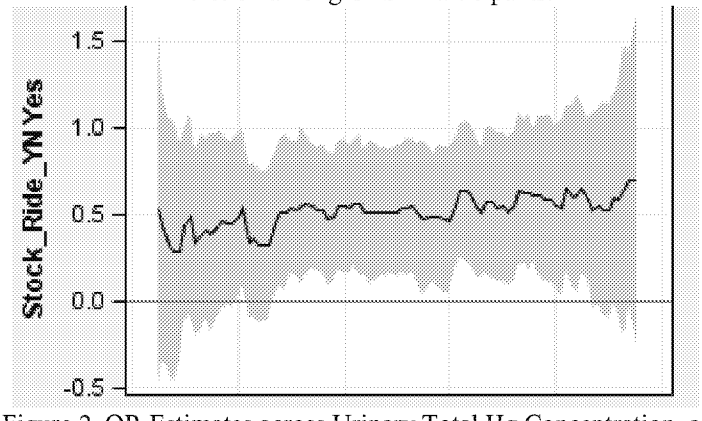

Figure 2. QR Estimates across Urinary Total Hg Concentration, as a Function of Livestock Handling Land Use Activities

Sampling sites will be located outdoors in three different locations: one at the centrally located Keya Foundation in Eagle Butte, SD, and 2 more at satellite locations for comparison across the community for accurate representation (Cherry Creek, SD and Timber Lake, SD Tribal townships). A commercially-available MerPAS Hg vapor sampler, fitted with a white body diffusive barrier, will be deployed at each sampling site. This particular model, as recommended by the manufacturer, is best used for sampling outdoor ambient air of expected low Hg concentrations (0.0-2.5 ng/m^3), and for deployment 30 day intervals of one month, as is proposed for our study (See Table 1).

Table 1. Recommended MerPAS Mercury Vapor Sampler Guidance

Outside Ambient Air	Typical Hg Range (ng/m^3)	Recommended Sampler Type	Deployment Time (Days)		
			Minimum	Recommend	Maximum
Remote	0.5-2.5	White-Jar	7	30	365
Urban Industrial	2-20	White-Jar	5	14	90
Hg Contaminated - Fenceline	10-5,000	Yellow-Jar	1	7	30
Hg Contaminated - Onsite	200-100,000	Yellow-Jar	1	1	7

Gravimetric sampling on filters for subsequent $PM_{2.5}$ mass and elemental concentration determinations will be conducted at each sampling site using SKC 2.5 Mass PEM Filter Holders/Impactors that have been employed by Dr. Thurston in past environmental monitoring research (e.g., Vilcassim et al., 2014). $PM_{2.5}$ samples will be collected on Teflon filters for analysis of some 30 particle-associated metals (via x-ray fluorescence, XRF), and for black carbon (via Reflectance), at NYU. Conducting week long sample collections will provide greater sampling volume than usual 24-hr sample periods (e.g., as collected by the EPA CSN Network), making the elemental concentration detection limits (in ng/m^3) far lower than using usual 24 hr. sample collections.

Low-cost commercial Purple Air continuous $PM_{2.5}$ samplers, that employ a light scattering method to provide an indirect measure of $PM_{2.5}$, will also be deployed at each site. Light scatter is registered by a detector and employed to estimate a mass-based measurement. Such units are commonly and successfully used for community air monitoring programs (e.g., Connolly et al, 2022). Once calibrated to gravimetric $PM_{2.5}$ concentrations, the Purple Air unit will provide valid and continuous 1-hour average $PM_{2.5}$ concentrations throughout the sampling campaign. For example, New York state has a Relative Humidity-dependent conversion formula it developed for Purple Air units, as have researchers using nationwide data, allowing a calibration of these data to gravimetric $PM_{2.5}$ measurements (Barkjohn et al, 2021). We will develop a similar site-specific $PM_{2.5}$ mass calibration as part of this work using the one-week average gravimetric $PM_{2.5}$ particle mass samples and Relative Humidity data collected simultaneously. The resulting continuous $PM_{2.5}$ data will provide insight into the community's time-of-day PM exposure variations.

In addition to the air pollution monitoring equipment, each sampling site will have a co-located low-cost meteorological sampling station that is commercially sold as part of the nationwide "Weather Underground" network. This will include temperature, relative humidity, and wind direction data that will be useful for the Purple Air calibration, as well as for the later interpretation of the air pollution exposure data sources.

Descriptive statistics to characterize exposure measurements will be developed. Comparisons will be made to relevant health guidance levels (e.g., ambient air quality standards). Also, multivariate source apportionment will be applied to the $PM_{2.5}$ and trace element concentrations data to assess the source-specific pollutant source-mixtures contributing to the ambient air pollution exposures. Source apportionment is a set of statistical techniques by which air pollution measurements are analyzed to determine contributions from various sources. Dr. Thurston, who will guide the source apportionment work, has been a leader in this approach for decades. He first published the Absolute Principle Component Score (APCS) source apportionment method, an approach that is now widely applied (Thurston and Spengler, 1985), and will be employed in this work.

iii. Expected Results

$PM_{2.5}$ mass and airborne metal levels across the reservation will be monitored, characterized, and compared at sites roughly 50 miles Northeast and Southwest of the centrally located station in Eagle Butte, SD. Comparisons will be made between air predominantly arriving at the west end of the reservation vs. that exiting the reservation in the East to separate the transported (e.g., from coal plants) vs. local (e.g., related to resuspended mine tailings along the Cheyenne River banks) air contaminants. This will be based on a $PM_{2.5}$ source apportionment at each site, such as derived from the major coal fired power plants still in operation upwind of the reservation (e.g., in Wyoming, Montana, and Utah), which can be identified by the $PM_{2.5}$ content of key tracers such as As, Se, and S (Thurston et al, 2011). Comparisons will also be made with the EPA CSN monitoring data collected during the same period in Bismarck, ND and Sioux Falls, SD.

Table 2. shows an example $PM_{2.5}$ source apportionment analysis previously developed by Dr. Thurston using Chemical Speciation Network (CSN) trace element data. Correlations for each element with each factor reveal their interpretation, as noted in bold font (e.g., Se and As for coal). We will similarly analyze weekly ambient air $PM_{2.5}$ samples collected for the measurement of trace element concentrations to characterize the trace composition and source attributions for quantitative estimates regarding the types and sources of $PM_{2.5}$ that dominate exposures in the study locale.

Table 2. Factor Analysis of US CSN Speciation data (Thurston et al, 2011)

	soil	metals	traffic	salt	oil	steel	coal	wood
As	0.11	0.58	0.07	-0.08	0.02	-0.08	**0.49**	0.05
Ca	**0.75**	0.06	0.15	0.01	0.05	0.04	0.01	0.16
Cu	0.10	0.27	**0.73**	0.05	-0.10	0.14	-0.10	-0.15
Cl	-0.12	0.00	0.09	**0.58**	0.02	0.01	0.34	0.44
Fe	0.46	0.14	0.29	0.02	0.12	**0.64**	0.10	0.16
Pb	0.04	**0.87**	0.09	0.02	0.01	0.06	0.11	-0.01
Mn	-0.01	0.13	-0.02	0.02	0.02	**0.93**	0.02	0.02
Ni	-0.01	0.02	0.15	0.02	**0.82**	0.08	0.03	-0.09
Se	0.00	0.04	0.09	0.01	0.01	0.07	**0.87**	-0.03
V	0.07	0.03	0.08	0.08	**0.82**	-0.01	-0.01	0.09
Si	**0.85**	-0.01	-0.03	0.12	0.00	0.06	0.02	0.07
Zn	-0.02	**0.75**	0.09	0.13	0.04	0.22	-0.12	0.09
K	0.33	0.09	0.11	0.03	-0.01	0.10	-0.06	**0.78**
Na	0.01	0.11	-0.05	**0.86**	0.10	0.02	-0.08	0.09
Mg	0.43	-0.02	0.00	0.72	-0.03	0.03	-0.04	-0.24
EC	0.14	0.09	**0.68**	0.02	0.22	0.03	0.29	0.30
NO_2	-0.13	-0.05	**0.71**	-0.09	0.34	-0.04	0.10	0.13
$PM_{2.5}$	0.17	0.13	0.34	0.02	0.13	0.06	0.25	0.26

After sample analyses and interim data analyses are completed at NYU Lab, the air monitoring Community Advisory Board (CAB) and CRST Health Board will be updated of interim results. This is part of the annual reporting of the

study progress and process evaluation briefing that is critical for continued support and trust building. When final data analyses have concluded, a comprehensive report of the results will be prepared, comparing to known ambient standards and guidance levels. Policy analyses that identify potential initiatives at the federal, state, and local level will also be presented. This will serve as strong, scientific basis for crafting the CRST Air Pollution Action Plan that will identify feasible approaches to targeted decreases of PM and airborne metal exposures (see OUTCOMES of logic model). Investigators will work closely with the CAB and consult with CRST leadership, selected members of the CRST Health Board, the Tribal Council, the Director of the Missouri Breaks Industries Inc., and the Keya Foundation to review policy action options. The Final Report detailing our protocols, methods, analysis, and findings will then be disseminated by all project partners. As an educational and community air pollution monitoring sustainability outcome, the study enables potential expansions to other Lakota Tribes.

c. Community Engagement & Dissemination

Community engagement of the study will employ the news media (local CRST journal summary of data and student interns' interviews; advertisement of the results and requested local input and public comments to the Community Action Plan via local Tribal KIPI Radio 93.5) as well as strong social media presence led by Keya Foundation and CAB input. Keya is active on Instagram, Twitter and Snapchat platforms. CRST has its own Facebook page allowing free of charge information access to Tribal members who often have only cell phone Facebook access.

Structured community engagement will employ a *three-tier approach*. Changes in attitudes will be assessed through study-specific and culturally appropriate pre- and post-testing assessment tools congruent with NIH/NIEHS Partnerships of Environmental Public Health guidance and metrics (NIEHS 2012) and will be guided by CAB input and iterative evaluation processes.

The *first level* is centered on the Keya Foundation's activities in both the art and science education spheres, and be expanded to reach out to students across the Reservation schools and OLC campus locations (indicated as Educational Pipeline on Logic Model graph) for internship opportunities. In CRST, as well as among other Lakota Tribes, the student body consists of a larger portion of returning students and middle-aged Tribal members, who are back to learn new skills or to complete their previously interrupted education.

The second tier of community engagement and data dissemination includes the CAB who consist of members of both the CRST professional and business communities. Advisory input will be bi-directional, as members of the Tribal Environmental and Natural Resources group along with the Tribal Sanitarian, serve on the MBIRI and Keya-managed CAB. The CAB will provide direct input to location selection, information about expected conditions, as well as provide input on culturally-tailored material development. Air pollution monitoring and QA/QC process implementation protocol development will directly serve as environmental health research capacity building. Data will be regularly presented at least once each year to ensure communication and knowledge expansion.

The third tier of community inclusion will be carried out at the Tribal level and CAB members also include members from CRST leadership positions. This level of communication, and data and information sharing are detailed by and incorporated in the CRST Data Sharing Policy. All data belong to the CRST as mandated and ensured by federal law and Tribal sovereignty that guarantees the integrity and security of the process. Data applications and the CRST Air Pollution Acton Plan will be developed and shared throughout both the Tribe, as well as the overall scientific communities to support other underrepresented community members.

After the final results are compiled, a community-led Workshop with Native student participants trained in air quality sampling and data analysis, will be conducted to transfer their knowledge and findings to the community at large, stakeholders, policy-makers and regulators, as well as any other interested parties. The workshop will also communicate data limitations and uncertainties, as also detailed in the final report. This Report-back Workshop will build sustained capacity among the community to achieve specific policies that address community concerns related to air pollution, health, and quality of life.

d. Overall Study Processes and Evaluation

The study Logic Model (Figure 3) summarizes features and activities of the Keya Foundation and was designed to demonstrate how grass-root, empowered civic interest and public health activism can achieve the community goal – to reduce air pollution associated metal exposures for the CRST. The model, using traditional Lakota medicine wheel, outlining inputs and processes to be used and short- and long-term outcomes, will facilitate the creation of a Tribal Air Pollution Action Plan, the first step toward protecting the community from air pollutant exposures, including metals.

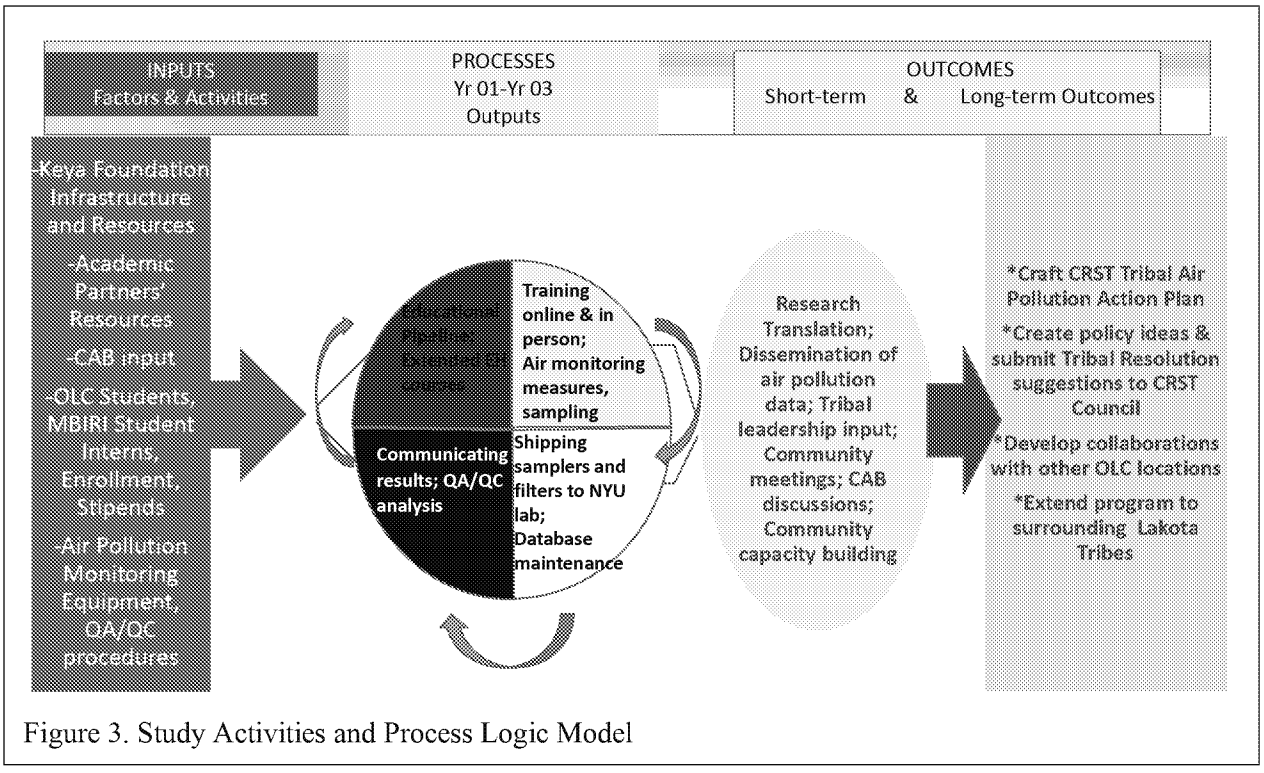

Figure 3. Study Activities and Process Logic Model

4. SUSTAINABILITY

The research results from this study will help create and maintain conditions under which humans and nature can exist in productive harmony, and that will permit fulfilling the social, economic, and other requirements of present and future Native American generations. By providing monitoring samplers to the community, and training current generations in exposure assessment, environmental health, air sampling, data collection, analyses and dissemination, the gained knowledge and capacity will continue long after project cessation. This will build a foundation of trusting relationships and enhanced understanding from which sustainable solutions to community air pollution problems can be initiated. Moreover, this project serves as a model for other marginalized and rural communities as other Tribal Colleges already expressed interests in collaboration both in Pine Ridge Reservation (Oglala Oyate) and in Sisseton-Wahpeton, SD, where no air monitoring has been present in the past. Therefore, Lakota/Dakota students will have access to all educational materials and methods developed under this initiative.

5. EXPECTED RESEARCH BENEFITS

This study will inform disenfranchised and vulnerable populations about air quality exposures where they live, as well enable them to independently collect air quality measurements, using low-cost, accurate, and well-validated instruments. The proposed study will result in quantifiable environmental benefits, both for the participants and the community at large, by empowering the community with information previously unavailable to them. We also expect that this information will also be useful for informing culturally-appropriate community action to improve their exposure to particulate and metal air pollution. This project will provide outputs consistent with those requested in the RFA, including: Identification of air pollution; Community-specific assessments of air pollution data; Deployment of equipment to conduct air quality monitoring in or near underserved communities; Near real-time air quality data availability for communities and other stakeholders; and, Promotion of partnerships and community involvement through outreach activities and information exchanges.

6. GENERAL PROJECT INFORMATION

a) U.S. EPA RFA QUESTIONS:

What are the measurable short-term and longer-term results the project will achieve?

i.) In the short-term, the community will be informed about the nature of their ongoing exposures to $PM_{2.5}$ and associated metals in the air they breathe.

ii.) In the longer term, training of local Lakota students by NYU study scientists (in all aspects of the research and data analyses) will provide sustainable air pollution monitoring capacity in the community. In addition, the training and knowledge gain by the participating interns may also lead to a greater capability and interest in pursuing a career in environmental science. Changes in attitudes will be assessed through pre- and post-testing assessment tools.

Long-term knowledge of daily $PM_{2.5}$ levels provides the community members a sound scientific basis to make changes that will not only improve their own quality of life, but may also reduce morbidity and mortality for the community as a whole.

How will progress toward achieving the expected results be measured (including outputs and outcomes) and how will the approach use resources effectively and efficiently?-

Details of outputs and outcomes for this study are detailed in the study Logic Model (see Section 3.d.). Progress towards achieving air monitoring results will be reported at regular meetings with the air monitoring CAB. Changes in attitudes will be assessed through pre- and post-testing assessment tools. Evaluation will include number of partners who signed formal partnership agreements with the program and participate in board activities. Using qualitative survey and measures of satisfaction about the partnership will be evaluated. The program will seek changes as necessary in direction of the sampling as well as the way to conduct culturally appropriate board meetings and offer community-level updates and outreach materials of interim finding and process of the program as needed. Communication among partners will be also appraised via number of messages disseminated, and media channels used (e.g., radio, television, websites, brochures, live town hall meetings). Bidirectional communication will be tracked to ensure an equitable partnership. The number of people who received messages (website hits, social media "likes", brochures taken, radio or television audience estimates, meeting participants based on sign-in sheets) will be counted. We will describe efforts to ensure that culturally-appropriate messages were created and improved, as needed.

b.) STUDY MANAGEMENT STRUCTURE:

The study management will follow a multi-directional, respectful and equitable process. The presented structure (see Figure 4 that uses CRST-specific colors) was built on previous successes in communication, community-engaged scientific question development and continuous evaluation of the partnership. New scientific elements of capacity building, environmental health education and participation of student and academic members of the Team are noted.

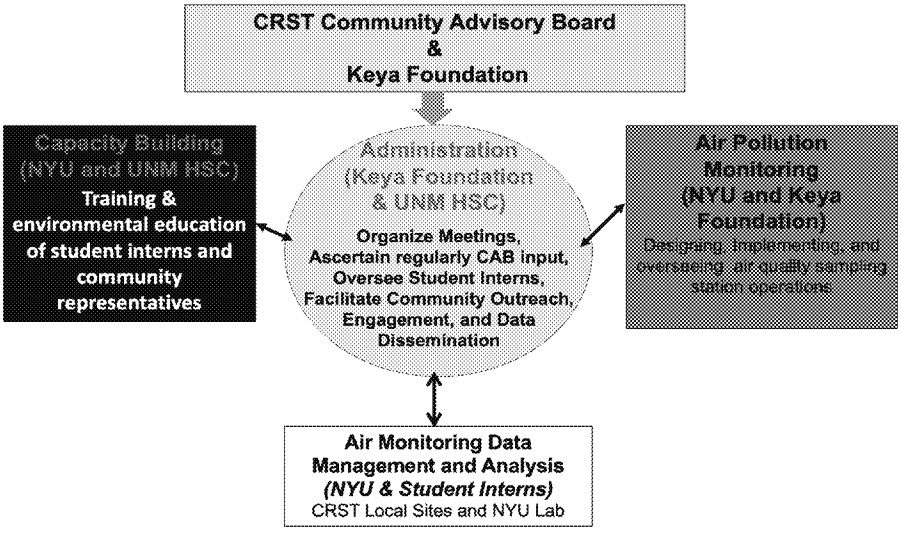

Figure 4. Management Structure of the Community Air Pollution Monitoring Program

c.) STUDY ACTIVITES TIMELINE & MILESTONES

	Year 1				Year 2				Year 3			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Study Setup and Recruitment and Training												
Ambient Air Sampling and Chemical Analyses												
Study Data Analyses												
Final Report Preparation												
Capacity Building												
Community Engagement and Data Dissemination												

PROGRAMMATIC CAPABILITY AND PAST PERFORMANCE

A. Past Performance within the past 3 years:

1) **Researching, Restoring and Rebuilding Our Oyate (People/Nation) for a Longer Life: A Research Symposium for Cheyenne River**; February 15 – August 15, 2019; Funding Source and Amount: South Dakota Community Foundation - $10,000 (grant); Project was successfully completed and was attended by 72 high school students and 4 teachers from 5 Tribal Schools.
2) **Native Arts Initiative**; July 1, 2019 – March 31, 2020; First Nations Development Institute - $2,700 (grant); This grant was provided to build the capacity of the Keya Foundation. The project was successfully completed with the foundation staff receiving trainings in non-profit management.
3) **Lakota Language Children Book Projec**t and **Dreamstarter**; August 1, 2018 - February 15, 2021; Running Strong for American Indian Youth - $65,000 (grant); Project was successfully completed. Published 10 different children books and distributed to 142 tribal schools in South/North Dakota.
4) **Lakota Artistry Cooperative**; November 1, 2021 – September 30, 2022; South Dakota Arts Council - $11,500 (state grant); This project is ongoing to support local Native American artists to develop their business through education, business/product development, and networking.

B. Reporting Requirements

1) **Researching, Restoring and Rebuilding Our Oyate for a Longer Life: A Research Symposium for Cheyenne River**; Reporting: A final evaluation report was completed and submitted detailing challenges, accomplishments, community impact and future plans. The report was approved and accepted.
2) **Native Arts Initiative**; Reporting: Completed a timely progress and financial report. The report was approved and accepted.
3) **Lakota Language Children Book Project and Dreamstarter**; Reporting: Completed timely quarterly report and a final report on programming and financials. The reports were approved and accepted.
4) **Lakota Artistry Cooperative**; Reporting: A financial and progress report is sent every time a payment is requested. All payments requested have been approved to date.

C. Staff Expertise

Project Director: Tammy Granados. Ms. Granados has been the Director of The Keya Foundation since 2019. She is an enrolled Cheyenne River Sioux Tribe (CRST) member and lives on the CRST reservation. She is currently pursuing a Bachelor's Degree in Social Work and will graduate in 2023. Ms. Granados grew up on CRST, and her experiences growing up in a single parent household with four siblings, has motivated her to get involved with her community. She has extensive experience working in community service organizations in tribal communities. Prior to her position at The Keya Foundation, Ms. Granados served as the Youth Program Director at the Cheyenne River Youth Project (CRYP), a non-profit organization that provides services to struggling families. At CRYP, Ms. Granados' responsibilities included managing staff and volunteers; planning, developing, and implementing youth programming; managing the collaboration with other partner organizations; hosting, and facilitating large community events; and fundraising. Her bio-sketch is found in Optional Attachments.

Board of Director (President): Marcia O'Leary, BSN, RN. Ms. O'Leary is a community member of the CRST Reservation, and she has developed professional relationships with medical providers, Tribal leadership and community members from the region. Together with her husband, Tim (an enrolled CRST member), they own a research organization, Missouri Breaks Industries Research Inc. (MBIRI) that is dedicated to researching pertinent health issues in rural American Indian communities and to reinvesting time and talent back into the Tribal communities through training and hiring practices. Ms. O'Leary has extensive experience working with tribal communities and in participatory-based observational and interventional research as a site principal investigator/project director. She is the Dakota's coordinator for the Strong Heart Study, and Strong Heart Family Study. A copy of her bio-sketch is attached in Optional Attachments section.

BUDGET

Budget Narrative

Personnel: Tammy Granados, Director of The Keya Foundation will serve as the Project Manager. Tammy is a tribal and community member of the Cheyenne River Sioux Reservation. She will oversee the project activities, collaborate with Oglala Lakota College to organize trainings, manage the project budget and subcontracts, consult with the Community Advisory Board, facilitate community engagement and disseminate findings to the community and tribal leadership, fulfill the requirements of the grant including reporting, and supervise staff. The project staff will assist with project activities, disseminate information, and assist with the organization of trainings. The annual salary for the Project Manager is $41,600 and the Project Staff is $31,200. Both Project Manager and Project Staff will devote 25% FTE in Year 1 to Year 3 to the project. Total personnel expenses for Year 1 to Year 3 is **$54,600**.

Fringe Benefits: Fringe Benefits are calculated at 20% of salary/wages; FICA (6.2%), Medicare (1.45%), SUTA (1.85%), Health Benefits (10.5%). Total fringe benefits for Year 1 to Year 3 is **$10,920**.

Travel: Project staff will travel to attend meetings and project activities, to facilitate meetings and trainings, and to disseminate information. The Cheyenne River Sioux Reservation (4th largest reservation in land area in the United States), covers a total area of approximately 4,300 square miles. Travel is a considerable expense due to the rural area with isolated pockets of population areas. We request mileage for 7,800 miles for the project @ $0.50 per mile. Total travel expenses for Year 1 to Year 3 is **$3,900**.

Supplies: Outreach/Community Engagement materials estimated at $8,400 include presentation supplies (poster boards, copying/printing ink cartridges, paper, markers); student supplies (note pads, file folders, pens/pencils, clipboards); Community Advisory Board supplies (refreshments for meetings), dissemination of informational materials (flyers, health fair booth fees, and project promotional items), community engagement expenses (social media, radio show, newspaper, red talk videos) and field site supplies (Wal-Mart gift cards for sampling site homeowners). Sampling supplies needed include portable air pump, air filters, calibrators, samplers, Underground Weather Observation Stations, housing to shelter air samplers, and brackets. The cost of sampling supplies is $17,955. Total supply expenses for Year 1 to Year 3 is **$26,355**.

Other: There will be 2 subawards; one for the University of New Mexico Health Sciences Center (UNMHSC) and the other for New York University School of Medicine (NYUSoM).

Dr. Esther Erdei, Ph.D. of UNMHSC will serve as a co-investigator, be a main contact for the study team, connecting academic partners and the Keya Foundation as well as the community with various outreach events and activities. She will assist the NYUSoM partners with developing outreach and sample collection training materials to train the study site student research assistants. She will also implement evaluation measures to estimate the effectiveness of the dissemination, as well as data collection process evaluation. She will assist the Keya Foundation and Tribal partners with continuous monitoring and reporting of the overall effectiveness of the program, air monitoring and sampling study. Total subaward for UNMHSC for Year 1 to Year 3 is **$47,902** (total direct cost: $31,411, total indirect cost 52.5%: $16,491).

Dr. George Thurston will serve as a PI on the NYUSoM sub-project for this study, which involves preparing, conducting, and disseminating the results from a two-year long monitoring program of the metal exposures in the air experienced by the CRST community in and around Eagle Butte, SD. Dr. Thurston will advise the Keya Foundation and data collection participants on the scientifically sound conduct of the air sampling program, as well as in the community capacity building and dissemination of study results activities. Dr. Judith Zelikoff will serve on the NYUSoM sub-project as a Co-Investigator collaborating with Dr. Erdei of the University of New Mexico and Keya foundation administrators in organizing and executing the community outreach and engagement activities, including data dissemination. A graduate assistant will assist Drs. Thurston and Zelikoff

in these contributions to the overall study, including the preparation and analysis of filter samples. Total subaward for NYUSMC for Year 1 to Year 3 is **$167,673** (total direct cost: $98,922, total indirect cost 69.5%: $68,751).

Rental and analysis fees for 3 units of Tekran MerPASS Mercury (Hg) vapor samplers for 24 months is needed to test the vapor samplers @ $187/sample; 24 x 3 x $187 = **$13,464**.
Postage and Shipping of samples to Tekran and NYU will be done monthly for 36 months. Costs for postage and shipping is estimated at $1,500 in Year 1 and Year 3, and $2,700 in Year 2, with a total of **$5,700**.
There will be 3 Environmental Science students selected for the project from Oglala Lakota College. These students will devote 8 hours a week for 26 weeks in Year 1 and Year 3 and 52 weeks in Year 2. These students will be provided a stipend of $15/hour. Total student stipend is **$37,440**.
The Community Advisory Board will be made up of seven members. The Community Advisory Board members are Amanda Fischer Walters (Customer Response Specialist at Black Hills Energy), Kelsie Haskell (Entrepreneur at All Things Kelsie Kay), Catherine Lawrence (RN at CRST Women's' Health), K'Lona Lofton (United Tribes Technical College Student and CRST Employee), Alli Moran (Paralegal at CRST), Shelby Thompson (Biomedical Specialist at Cheyenne River Service Unit), Joan Upell (Retired Educator). They will meet once a year to provide feedback on the project. Each member will be provided $75 honoraria per meeting. Total honoraria are $75 x 7 members x 3 years = **$1,575**.

Indirect: The Keya Foundation, Inc. will utilize the 10% de-minimis rate for indirect charges; 10% x $369,529 total direct cost = **$36,953** total indirect cost.

Expenditure of Awarded Funds

The Keya Foundation, Inc. has a Board of Directors with various skills and experiences. The Board of Directors gets quarterly updates on the finances and programming activities from the Director. The Board of Directors review the profit and loss and balance sheet reports quarterly. The foundation has proper accounting controls implemented to manage these funds when awarded. The organization utilizes the QuickBooks accounting software to manage budget, track expenditures and deposits, manage inventory, process payroll, and pay invoices. Different classes are set up on QuickBooks to ensure the separation of funds and expenditures of projects in the foundation. The Project Manager will be responsible to input the project transactions into QuickBooks. Payment of invoices are usually conducted bi-weekly. The Project Manager will prepare all payments and the Board President will review and sign the payment checks. All disbursements are properly documented with evidence of receipt of goods or performance of services. Cash reconciliations are carried out at least once a month. The Project Manager provides the Board President bank statements and reconciliation reports to review every month. The Project Manager will have the budget of the project tracked in QuickBooks to prevent expenditure of funds in excess of approved budgeted amounts. Any cost transfers are only made after review and approval from the Board President. Project personnel are responsible to certify their time on the project. The Project Manager will approve and certify project staff's timesheet.

Budget Table:

Line Item & Itemized Cost	EPA Funding
Personnel:	
1) Project Manager @ $20/hr x 10 hrs/wk x 156 wks	$31,200
2) Project Staff @ $15/hr x 10 hrs/wk x 156 wks	$23,400
TOTAL PERSONNEL	$54,600
Fringe Benefits:	
20% of Salary and Wages @ 20% x Total Personnel - Health Benefits, FICA, Medicare, SUTA	$10,920
TOTAL FRINGE BENEFITS	$10,920
Travel:	
Mileage for personnel @ $0.50/mile x 50 mile/wk x 156 wks	$3,900
TOTAL MILEAGE	$3,900
Supplies:	
Outreach/Community Engagement Materials and Supplies	$8,400
Four 10 lpm SKC portable air pumps @ $1,100/pump x 4 units	$4,400
Six SKC 2.5 Mass PEM Filter Holders/Impactors @ $600/filter x 6 units	$3,600
Three outdoor Underground Weather Observation Stations @ $500/station x 3 units	$1,500
One SKC Defender Air Flow Calibrator @ $2,000/calibrator x 1 unit	$2,000
Four Continuous PurpleAir PA-II-SD $PM_{2.5}$ Mass Sampler @ $280/sampler x 4 units	$1,120
Sampling Supplies – 37 mm Teflon filters for metals XRF analyses and QA filters; @ $12.10/each x 3 sites x 104 wks	$3,775
Tekran MerPASS Mercury (Hg) vapor air sampler holder brackets @ $20/unit x 3units	$60
Air Sampling Housing for security and weather protection @ $500/unit x 3 sites	$1,500
TOTAL SUPPLIES	$26,355
Other:	
Subaward Costs; NYU - $167,673, UNM - $47,902	$215,575
Rental and Analysis of Tekran MerPASS Mercury (Hg) vapor samplers and analysis fees and Q/A field blanks @ $187/sample x 24 months x 3 units	$13,464
Postage and Shipping Expenses of samples	$5,700
Environmental Science Student Stipend @ $15/hr x 8hr/wk x 104wk x 3 students	$37,440
Community Advisory Board Honoraria @ $75/mtg x 3 mtgs x 7 members	$1,575
TOTAL OTHER	$273,754
Indirect Charges:	
10 percent de minimis rate	$36,953
TOTAL INDIRECT	$36,953
TOTAL FUNDING	**$406,482**
TOTAL PROJECT COST	**$406,482**

NAME Tammy Granados	POSITION TITLE Director (2019 – present)		
INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
The Keya Foundation, Inc. 118 S. Willow Street, P.O. Box 1824, Eagle Butte, South Dakota, 57615	BSW candidate	05/2023	Social Work, Education

A. Personal Statement:

I am an enrolled Cheyenne River Sioux Tribe (CRST) member and a community member of the CRST reservation. Growing up in the reservation, I experienced the challenges stemming from poverty, health disparity, and inadequate infrastructure. My household consisted of my mother and my four siblings. Living on the reservation, I am surrounded by families, relatives and friends. My experiences have motivated me to get involved and build capacity in my community. I believe that it is crucial for my community to help itself and I am dedicated to ensuring that my people are served with the utmost respect and dignity. I have worked with non-profit organizations that provided direct services on Cheyenne River Sioux Reservation for over 14 years. I have managed several wellness projects and have extensive experience in implementing programs that are aimed at Sustainable Food Systems, Healthy Diets, and Diabetes Prevention. In my current position as the Director of The Keya Foundation, I work with community members, tribal council members, tribal organizations, and tribal schools to develop programs that will benefit our community and promote holistic health. The Keya Foundation's mission is to build organizational partnerships with underserved communities to provide knowledge, cultural renewal, and social health to individuals and families, which will ensure a future of endurance, longevity, and protection for the people in the community. The "Cheyenne River Sioux Tribal community exposures to metals in the air" project will be implemented by our people for our people. This project is very beneficial to the Cheyenne River Sioux Reservation since there has not been any air pollution data generated on metal exposures originated from air pollutants here. This project involves our local tribal college and will train tribal members in epidemiology and public health methods. The strong science education component of this project will help build capacity and expertise in our community. This project will help the people we love and care for work towards a healthy and thriving life. I am confident that my skills, experiences, and knowledge will be beneficial to implement this project and bring it to a successful conclusion.

B. Positions and Employment:

2007-2010 Youth Program Assistant, Cheyenne River Youth Project
2009-2010 Direct Care Counselor, Pierre Indian Learning Center
2011-2013 Wellness Coordinator, Cheyenne River Youth Project
2013-2017 Youth Program Director, Cheyenne River Youth Project
2018-present Special Education Paraprofessional, Tiospaye Topa School
2019-present Director, The Keya Foundation

C. Other Experiences and Professional Memberships

2021	National Exercise Trainers Association (NETA) Certified Personal Trainer
2021	First Aid Certified, American Red Cross
2021	Applied Suicide Intervention Skills Training (ASIST) Suicide Prevention Certified
2021	CPR Certified, American Red Cross
2021	Food Handler Certified, Cheyenne River Sioux Tribe

D. Contribution to Science

Research Symposium: Researching, Rebuilding and Restoring our Oyate for a Longer Life:

I assisted in the organization and facilitation of the Annual Research Symposium at Cheyenne River Sioux Reservation. The Annual Research Symposium was established in 2015 and is provided at no cost to participants. The overall goal of the symposium is to build capacity in the community, to bridge the ideological divides of western knowledge and American Indian traditions and methods of healing, increase the understanding of biomedical research in the community, engage youth in biomedical research through the understanding of data collection and data application, and bridge relationships between community members and researchers in hope that community members feel protected and have an ownership of the researches done in the community. The symposium is attended by high school students and adults of the Cheyenne River Sioux Reservation.

NAME Marcia O'Leary	POSITION TITLE Director (1997 – present)		
INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Missouri Breaks Industries Research, Inc. 118 S. Willow Street, P.O. Box 1824, Eagle Butte, South Dakota, 57615	BSN	2007	Nursing

A. Personal Statement:

As the coordinator for the past 5 phases of the Strong Heart Study, as well as the Strong Heart Family Study and current Phase VII, I have worked with many community members, tribal council members, and health directors. Missouri Breaks Industries Research Inc. is an American Indian-owned business that was established to bridge the scientific gap that exists in rural American Indian communities. I have an established record for conducting ethical community-based research for Missouri Breaks Industries. Our focus is to work with scientists and tribal communities from across the nation to assist with research on issues of special importance to American Indians. We have worked successfully on a wide range of projects. Among them are the "Health Effects and Geochemistry in Arsenic Study" with Columbia University, the "NARCH 7: Complex Metal Exposure and Immune Status on the Cheyenne River" with University of New Mexico, and the "Participatory Intervention to Reduce Arsenic in American Indian Communities" with Johns Hopkins University. We have experience recruiting participants and collecting biological, socioeconomic, psychosocial, anthropometric data. We engage with community members by using cultural-based participatory research such as conducting talking circles for a variety of projects.

As the Board President of the Keya Foundation, I will bring these valuable assets to the program, contributing to the increased efficiency in data collection and improve the ability to translate the information back into the communities. Thus, I have the skills, experience, and knowledge needed to implement this project and bring it to a successful conclusion.

B. Positions and Honors:

2019-2024 Site Principal Investigator, AMERICAN INDIAN CHronic disEase RIsk and Sleep Health (AI-CHERISH), Washington State University

2019-2026 Site Project Coordinator, Strong Heart Study Phase VII Dakota Field Center

2020-2022 Site Project Coordinator, CoVPN 3004 Protocol Funding (PF) - Eagle Butte, SD Protocol-Specific Site, Fred Hutchinson Cancer Research Center

2020-2022 Site Principal Investigator, American Indian and Alaska Native Health Disparities, University of Colorado

2020-2025 Site Principal Investigator, Resilience, cultural alignment, and social support in brain aging: Data from the Strong Heart Study, Washington State University

2020-2025 Site Principal Investigator, Gut microbiome, aging and cardiometabolic diseases in American Indians, University of Florida

2021-2024 Site Principal Investigator, Psychological risk factors, quality of life, community, and brain aging in American Indians: The Strong Heart Study, Washington State University

2021-2026 Site Principal Investigator, Natives Engaged in Alzheimer's Disease (NEAR): Research Project 3: CATNAP, Washington State University

2021-2024 Site Principal Investigator, Harnessing Microbial Batteries for Efficient, Sustainable Water Treatment and Recycling in Rural Areas, Columbia University

C. Professional Memberships, Appointments, Advisory Boards (Examples):

1972-1976 Chairperson, Dewey County Heart Association, Timber Lake, SD
2004-2010 Member, American Diabetes Association
2004-present Member, State of South Dakota Comprehensive Cancer Coalition
2010-present Member, American Public Health Association
2013-present Member, Community Advisory Group Cheyenne River Sioux Tribe of South Dakota
2009-present Advisory Member, Canli Coalition, Eagle Butte, SD
2020-present Board President, The Keya Foundation

D. Peer-reviewed publications
(https://www.ncbi.nlm.nih.gov/myncbi/marcia.o'leary.1/bibliography/public/)

1. Sobel M, Sanchez TR, Zacher T, Mailloux B, Powers M, Yracheta J, Harvey D, Best LG, Bear AB, Hasan K, Thomas E, Morgan C, Aurand D, Ristau S, Olmedo P, Chen R, Rule A, **O'Leary M**, Navas-Acien A, George CM, Bostick B. Spatial relationship between well water arsenic and uranium in Northern Plains native lands. Environ Pollut. 2021 Oct 15;287:117655. doi: 10.1016/j.envpol.2021.117655. Epub 2021 Jun 25. PubMed PMID: 34426377; PubMed Central PMCID: PMC8434972.
2. Blacksher E, Hiratsuka VY, Blanchard JW, Lund JR, Reedy J, Beans JA, Saunkeah B, Peercy M, Byars C, Yracheta J, Tsosie KS, **O'Leary M**, Ducheneaux G, Spicer PG. Deliberations with American Indian and Alaska Native People about the Ethics of Genomics: An Adapted Model of Deliberation Used with Three Tribal Communities in the United States. AJOB Empir Bioeth. 2021 Jul-Sep;12(3):164-178. doi: 10.1080/23294515.2021.1925775. Epub 2021 Jun 14. PubMed PMID: 34125006; PubMed Central PMCID: PMC8274345.
3. Hiratsuka VY, Beans JA, Reedy J, Yracheta JM, Peercy MT, Saunkeah B, Woodbury RB, **O'Leary M**, Spicer PG. Fostering Ethical, Legal, and Social Implications Research in Tribal Communities: The Center for the Ethics of Indigenous Genomic Research. J Empir Res Hum Res Ethics. 2020 Oct;15(4):271-278. doi: 10.1177/1556264619872640. Epub 2019 Sep 9. PubMed PMID: 31496352; PubMed Central PMCID: PMC7061084.
4. Nigra AE, Olmedo P, Grau-Perez M, O'Leary R, **O'Leary M**, Fretts AM, Umans JG, Best LG, Francesconi KA, Goessler W, Cole SA, Navas-Acien A. Dietary determinants of inorganic arsenic exposure in the Strong Heart Family Study. Environ Res. 2019 Oct;177:108616. doi: 10.1016/j.envres.2019.108616. Epub 2019 Aug 1. PubMed PMID: 31442790; PubMed Central PMCID: PMC6748659.
5. Thomas ED, Gittelsohn J, Yracheta J, Powers M, **O'Leary M**, Harvey DE, Red Cloud R, Best LG, Black Bear A, Navas-Acien A, George CM. The Strong Heart Water Study: Informing and designing a multi-level intervention to reduce arsenic exposure among private well users in Great Plains Indian Nations. Sci Total Environ. 2019 Feb 10;650(Pt 2):3120-3133. doi: 10.1016/j.scitotenv.2018.09.204. Epub 2018 Sep 18. PubMed PMID: 30373089; NIHMSID:NIHMS1509302.
6. Powers M, Yracheta J, Harvey D, **O'Leary M**, Best LG, Black Bear A, MacDonald L, Susan J, Hasan K, Thomas E, Morgan C, Olmedo P, Chen R, Rule A, Schwab K, Navas-Acien A, George CM. Arsenic in groundwater in private wells in rural North Dakota and South Dakota: Water quality assessment for an intervention trial. Environ Res. 2019 Jan;168:41-47. doi: 10.1016/j.envres.2018.09.016. Epub 2018 Sep 15. PubMed PMID: 30261340; PubMed Central PMCID: PMC6296218.

NAME George D. Thurston		POSITION TITLE Professor, Environmental Medicine and Population Health	
INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
NYU Medical Center Environmental Medicine, 341 E. 25th Street, NY, NY	Sc.D. Harvard University School of Public Health	1982	Environmental Health

A. Personal Statement: Dr. Thurston, who is a tenured full professor and Principle Investigator, has >30 years of experience in air pollution monitoring and exposure assessment, is well prepared to guide the air monitoring program to be conducted in this research. Dr. Thurston will oversee. all aspects of the air monitoring, and lead the exposure assessment component of the study. He is Director of his department's academic Program in Exposure Assessment and Health Effects at the NYU School of Medicine's Department of Environmental Medicine, and is highly qualified to lead this proposed investigation of the health effects of environmental exposures, including particulate matter air pollution. He has led multiple field studies into the human exposures and health effects of air pollution, both domestically and internationally. He has published widely in the scientific literature on the assessment of exposures to ambient air pollution and their human health consequences. Dr. Thurston is especially an expert on the health effects of particulate matter, having published the first manuscript relating $PM_{2.5.}$ mass and sources to human mortality in 1987. Today, he is one of the leading researchers on the assessment of air pollution exposures and their health effects, having worked and published upon the analyses of multiple cohorts, including the ACS studies, and was the Contact PI for an a previous very productive, NIH-funded investigation with Dr. Hayes of the NIH-AARP cohort and air pollution.

A. Positions and Honor

Positions and Employment:

1978-1982 Researcher, Harvard University School of Public Health, Dept. of Environ. Health, Boston, MA

1982-1984 Research Fellow, Harvard University, Kennedy School of Government, Health & Environmental Policy Center, Cambridge, MA

1984-1987 Research Assistant Professor, Department of Environmental Medicine, New York University School of Medicine, New York, NY

1987-1993 Assistant Professor, Department of Environmental Medicine, New York University School of Medicine, New York, NY

1993-2006 Associate Professor (Tenured), Department of Environmental Medicine, New York University School of Medicine, New York, NY

1995-2004 Director, Community Outreach and Education Program, NIEHS Center of Excellence, New York University School of Medicine, New York, NY

2002-2012 Deputy Director, NYU Particulate Matter Center, NYU School of Medicine, New York, NY

2007-pres. Professor (Tenured), Dept. of Environmental Medicine, New York University School of Medicine, New York City, NY.

2007-2010 U.S. EPA Clean Air Science Advisory Committee (CASAC). Sulfur Oxides and Nitrogen Oxides Committee member

2007-pres. Affiliated Faculty, Environmental Studies Program, College of Arts and Sciences, New York University, New York City, NY.

2010-2018 Co-Leader, Metals Research Focus Group, NYU-NIEHS Center of Excellence, Department of Environmental Medicine, Tuxedo, NY.

2012-pres. Director, Academic Program in Exposure Assessment and Human Health, Dept. of Environ. Medicine.

2012-pres. Faculty Mentoring Champion, Dept. of Environmental Medicine, New York University School of Medicine, New York City, NY.

2012-2016 Chair, Appointments and Promotions Committee, Department of Environmental Medicine, NYU School of Medicine, New York, NY.

2021-pres Chair, Appointments and Promotions Committee, Department of Environmental Medicine, NYU School of Medicine, New York, NY.

Honors:

Nov. 1999 Orange Environment Citizens Action Group, OE Award for Excellence in Translating Science to the Public

Dec. 2000 NYU School of Medicine Dean's Research Incentive Award

Oct. 2012 Awarded the 2012 Haagen-Schmidt Prize from the journal Atmospheric Environment.

Mar. 2013 Senior Author of Manuscript named "Best Paper of 2012-Science" by the journal ES&T

May 2018 Awarded the American Thoracic Society's "Public Service" Award

D. Key Peer-reviewed publications (out of >150)

1. Monitoring of Ambient Air Pollution

a. Spengler, J.D. and G.D. Thurston. Mass and elemental composition of fine and coarse particles in six U.S. cities. J. Air Poll. Control Assoc. 33: 1162-1171 (1983).

b. Thurston, G.D., J.F. Gorczynski Jr., P. Jaques, J. Currie and D. He. An automated sequential sampling system for particulate acid aerosols: Description, characterization and field sampling results. J. Exposure Anal. Environ. Epidemiol. 2: 415-428 (1992).

c. Thurston, G.D., K. Ito, P. Kinney and M. Lippmann. A multi-year study of air pollution and respiratory hospital admissions in three New York State metropolitan areas: Results for 1988 and 1989 summers. J. Exposure Anal. and Environ. Epidemiol. 2: 429-450 (1992).

d. Thurston, G.D., J.E. Gorczynski, J.H. Currie, D. He, K. Ito, M. Lippmann, J. Waldman and P. Lioy. The nature and origins of acid aerosol pollution measured in Metropolitan Toronto, Ontario. Environ. Res. 65:254-270 (1994).

e. T**hurston GD**, Lippmann M, Scott MB, Fine JM. Summertime haze air pollution and children with asthma. Am J Respir Crit Care Med. 1997 Feb;155(2):654-60).

f. Spira-Cohen A, Chen LC, Kendall M, Sheesley R, **Thurston GD.** (2010). Personal exposures to traffic-related particle pollution among children with asthma in the South Bronx, NY. J Expo Sci Environ Epidemiol. 2010 Jul;20(5):446-56. Epub 2009 Oct 28.

2. Source Apportionment of Pollution

a. Currie L, Gerlach R, Lewis C, Balfour WD, Cooper J, Dattner S, DeCesar R, Gordon G, Heisler S, Hopke P, Shah J and **Thurston G**. Inter-laboratory comparison of source apportionment procedures: Results for simulated data sets. Atmos. Environ. 18: 1517-1537 (1984)

b. **Thurston GD** and Spengler JD. A quantitative assessment of source contributions to inhalable particulate matter in metropolitan Boston, Massachusetts. Atmos. Environ. 1985 19: 9-25.

c. Hopke PK, Ito K, Mar T, Christensen WF, Eatough DJ, Henry RC, Kim E, Laden F, Lall R, Larson TV, Liu H, Neas L, Pinto J, Stolzel M, Suh H, Paatero P and **Thurston GD**. PM source apportionment and health effects: 1. Intercomparison of source apportionment results. J Expo Sci. Environ Epidemiol. 2006 May;16(3):275-86

d. **Thurston G.**, Ito K, and Lall R. A Source Apportionment of U.S. Fine Particulate Matter Air Pollution. Atmospheric Environment. 2011Aug. 45(24): 3924-3936. PMCID: PMC3951912.

3. *Source Apportionment of the Human Health Effects of Air Pollution*

a. Ozkaynak H and **Thurston GD.** Associations between 1980 U.S. mortality rates and alternative measures of airborne particle concentration. Risk Analysis 7: 449-460 (1987).

b. **Thurston GD,** Ito K, Mar T, Christensen WF, Eatough DJ, Henry RC, Kim E, Laden F, Lall R, Larson TV, Liu H, Neas L, Pinto J, Stolzel M, Suh H, Hopke PK. Workgroup report: workshop on source apportionment of particulate matter health effects--intercomparison of results and implications. Environ Health Perspect. 2005 Dec;113(12):1768-74. PMCID: PMC1314918.

c.**Thurston GD**, Burnett RT, Turner MC, Shi Y, Krewski D, Lall R, Ito K, Jerrett M, Gapstur SM, Diver WR, Pope CA. Ischemic Heart Disease Mortality and Long-Term Exposure to Source-Related Components of U.S. Fine Particle Air Pollution. Environ Health Perspect. 2016 Jun;124(6):785-94. doi: 10.1289/ehp.1509777. Epub 2015 Dec 2.

NAME Judith T. Zelikoff, Ph.D.		POSITION TITLE Professor, Environmental Medicine	
INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
NYU Medical Center Environmental Medicine, 341 E. 25th Street, NY, NY	Ph.D.	1982	Experimental Pathology

A. Personal Statement: Dr. Zelikoff, a tenured full professor and Principle Investigator, has >25 years of experience using animal models for inhalation toxicology of contaminants including metals, combustible products from cigarettes, wood burning and diesel exhaust. Over the last 15 years, studies in this laboratory have focused on prenatal exposure of mice to nanomaterials, ambient particulate matter (PM), metals and tobacco products. The PI has extensive experience as a mentor – having directly advised ~20 undergraduates, >50 master students, 15 doctoral candidates in Environ. Medicine. Students working in her laboratory have won numerous scientific awards from the Society of Toxicology including the Novartis Student Award for Excellence. Dr. Zelikoff also directs courses in toxicology, immunotoxicology, and organ system toxicology to graduate students throughout NYU. As the previous NYU NIEHS P30 Director of the Community Engagement Core ((2006-2022) and the current Community Outreach Director and co-Director of the DEI Task Force for Environmental Medicine, Dr. Zelikoff has led numerous community-guided and enrichment initiatives that have served to set public policy and improve public health by informing local, disenfranchised communities of environmental health. In this capacity, Dr. Zelikoff has partnered for >9 years with the environmentally-impacted Ramapough Lenape Tribe for >9-years to build capacity and environmental health knowledge through such activities as citizen-scientist-led exposure assessment projects (air, water, fish, plants), Wellness Sharing and Drum Circles, Bereavement groups, and Townhalls and interactive programs. She has also worked with Dr. Erdei and the Cheyenne River Sioux Tribe and Missouri Breaks for > 2 years on capacity-building projects. Over the last 2-years, Dr. Zelikoff and her community outreach team have collaborated closely with two Community-based Environmental Justice Organizations in north Brooklyn (NY) to deploy air monitors in community-selected sites for measuring ambient particulate matter (PM), elemental/organic carbon, volatile organic chemicals (VOCs), polycyclic aromatic hydrocarbons (PAHs) and soil metal burdens in parks and other recreation sites. She continues to work with both the Ramapough Nation and Brooklyn CBOs on dissemination of collected data and Report-back sessions. In addition, Dr. Zelikoff currently serves as the President of the Inhalation and Respiratory Specialty Section of the Society of Toxicology (SOT) and past-president of both the Metals and Immunotoxicology SOT Specialty Sections where she received a Lifetime Achievement Award. Dr. Zelikoff currently serves as a member of the National Academy of Science Advisory Panel on "*The Chemistry of Fires at the Wildland-Urban Interface*." She also served as Chair of the NASA panel on Moon Dust and currently participates as a member of the Human Health Panel for the United Nations Environmental Program on the health effects associated with the Atmospheric Brown Cloud. Currently, she is an Associate Editor for *J. Inhalation Toxicology* and has >150 peer-reviewed papers and book chapters on inhalation toxicology, environmental health, and community and public health topics. Thus, she is very well poised to serve as co-Investigator on the proposed grant.

B. Positions and Honors:

2004-pres. Tenured-Full Professor, NYU School of Medicine, Dept. of Environ. Medicine, Tuxedo, NY
2005-2022 Director, NYU NIEHS Community Outreach and Engagement Core, NYU School of Medicine.
2022-present: Director, Community Outreach and Engagement Program, Dept. Environ. Med
2012 Lifetime Achievement Award in Immunotoxicology
2013 Host Global Scholar Award
2015 Women in Toxicology, Mentorship Award
2018 SOT Education Award
2019 Community Award, Garfield Police Dept. Garfield, NJ
2021 Community Ally Award, North Brooklyn Neighbors CBO, Williamsburg, Brooklyn

C. Professional Memberships, Appointments, Advisory Boards (Examples):

2003-2004	SOT: Metals Specialty Section, President
2003-2004	SOT – Sub-Committee for Minority Initiatives, Chair
2004-2005	SOT – Education Committee, Chair
2011-2014	SOT – Executive Council, Secretary
2016-2017	SOT – Committee for Diversity Initiatives, Chair
2017-2018	SOT - Ethical, Legal, Societal Issues Specialty Section, President
2020-2022	SOT – Women in Toxicology SS, Senior Councilor
2021-2022	SOT - Inhalation and Respiratory Toxicology Specialty Section, President
2020-2022	National Academy of Science (NAS) – Advisory Panel, "*Chemistry of Fires at Wildland-Urban Interface.*

D. Peer-reviewed publications (out of >150)

1. Meltzer G., Avenbuan, O., Wu, F., Shah, K., Chen, Yu., Mann V*., **Zelikoff JT**. The Ramapough Lunaape Nation: Facing health impacts associated with proximity to a Superfund site. J. *Community Health*. Vol. 45, 1196–1204. (2020). *Chief of the Ramapough Turtle Clan
2. Meltzer GY, Watkins BX, Vieira D, **Zelikoff JT**, Boden-Albala B. A Systematic Review of Environmental Health Outcomes in Selected American Indian and Alaska Native Populations. J *Racial Ethn Health Disparities*. 2020 Aug;7(4):698-739.
3. **Zelikoff JT**., Shah K., Meltzer, G., Avenbaun O., Chen Y., Wu FW. Environmental Health in Ringwood and the Ramapough Lenape Nation. In: *Our Land Our Stories: Excavating subterranean histories of Ringwood mines and the Ramapough Lunaape*. Vol 1 & 2. Rutgers Publisher. 2019, 2022.
4. Doherty Lyons SP, Bari S, Gany F, Leng J, Duch T*, Reveille D*, Morris JS, Hernandez M, Nadas A, Costa M and **Zelikoff JT*** Community health perceptions and human environmental exposure to chromium contamination in a small New Jersey City. *Preventive Medicine and Community Health*. doi: 10.15761/PMCH.1000122. (2019). *Garfield governing and public health officials.
5. Klocke C, Sherina V, Graham UM, Gunderson J, Allen JL, Sobolewski M, Blum JL, **Zelikoff** JT, Cory-Slechta DA. Enhanced cerebellar myelination with comcomitant iron elevation and ultrastructural irregularities following prenatal exposure to ambient particulate matter in the mouse. *Inhal. Toxicol*. 30(9-10): 381-396. 2018. PMCID: PMC6400059
6. Klocke C, Allen JL, Sobolewski M, Blum JL, **Zelikoff** JT, Cory-Slechta DA. Exposure to fine and ultrafine particulate matter during gestation alters postnatal oligodendrocyte maturation, proliferation capacity, and myelination. *Neurotoxicol*. 65:196-206. 2018. PMCID: PMC5857223
7. Klocke C, Allen JL, Sobolewski M, Mayer-Pröschel M, Blum JL, Lauterstein **Zelikoff** JT, Cory-Slechta DA. Neuropathological consequences of gestational exposure to concentrated ambient fine and ultrafine particles in the mouse. *Toxicol. Sci*. 1:156(2):492-508. 2017. PMCID: PMC6074840.
8. Blum JL, Chen LC, **Zelikoff JT.** Exposure to ambient particulate matter during specific gestational periods produces adverse obstetric consequences in mice. *Environ. Health Perspect*. 125(7):077020. Doi:10:1289/EHP1029. 2017. PMCID: PMC5744697.
9. **Zelikoff, J.T.**, K.R. Schermerhorn, K. Fang, M.D. Cohen, and Schlesinger, R.B. A role for associated transition metals in the immunotoxicity of inhaled ambient particulate matter (PM). *Environ. Health Perspect.* 110:871-875 (2002).
10. **Zelikoff, J.T**., L.C. Chen, M.D. Cohen, K. Fang, T. Gordon, Y. Li, C. Nadziejko, and R.B. Schlesinger. Effects of inhaled ambient particulate matter (PM) on pulmonary anti-microbial immune defense. *Inhal. Toxicol.* 15:101-120 (2003).

NAME Esther Erdei, Ph.D., MPH.	POSITION TITLE Research Assistant Professor		
INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
University of New Mexico Health Sciences Center, College of Pharmacy Pharmaceutical Sciences; Albuquerque, NM	Ph.D. M.P.H.	2003 2010	Immunology Epidemiology

A. Personal Statement: Dr. Erdei is a faculty member and Principle Investigator, has >20 years of experience in public health and population-based environmental health research. Her overarching research interest is to integrate her laboratory expertise in immunology and genetics, classical and molecular epidemiology with environmental health problem solving in various communities excessively affected by toxicants. She focuses on integrating immune system analyses and exposure assessment of mine waste metals (Hg, As) to understand various exposure patterns. For over 13 years she supported works in exposed communities in the Southwest (Navajo Nation, Laguna Pueblo) and the Midwestern U.S. (Cheyenne River Sioux and Crow Nation/Apsalooke). She was the first Clinical Translational Research Fellow (CTSC Participatory Research Center) to apply community-engaged health effect research in the Cheyenne River Sioux communities. She has supported the CRST Tribal leadership and Missouri Breaks Industries Research with data and scientific evidence in their quest to solve metal mixture contamination problems originated from more than 900 mine operations upstream of the Cheyenne River in the Black Hills area of South Dakota. Dr. Erdei is the Co-Lead of the UNM Native Environmental Health Equity Center Community Engagement and Dissemination Core and PI of the BP1 of the P50 Center. Through her P50 Center work, she has been in continuous contact with the Keya Foundation and supported their activities both in education and as a scientific contributor and organizer of the CRST Annual Research Symposium. She also serves as Core Director of the Mountain West CTR-IN Core at the UNM HSC. Dr. Erdei was invited to contribute as member of the National Academy of Science Advisory Panel on "*Translatable and Accessible Biomarkers of Effect: From Model Systems to Humans*." Currently, she is an Associate Editor for *Frontiers of Immunology* and has >65 peer-reviewed papers and book chapters on autoimmunity, autoimmune disease epidemiology, genetic epidemiology, cancer immunology, immune system dysfunction, environmental health, and community and public health topics. Therefore, her expertise and local, community knowledge and research support will make her a key member of the Research Team and will serve as co-Investigator on the proposed grant.

B. Positions and Honors:

1991 - 1995 Junior Faculty position, Eotvos Lorand University of Arts and Sciences, Faculty of Natural Sciences University of Natural Sciences- Department of Genetics, Population Genetics and Biochemical Research unit

1995 – 2003 Head of Immunology Research group, National Institute of Environmental Health, Jozsef Fodor National Public Health Center, Budapest, Hungary, Department of Biological Monitoring

2004 - 2006 University of New Mexico, School of Medicine, Department of Internal Medicine, Division of Epidemiology & Biostatistics, post-doctoral research scholar on molecular epidemiology of cancer and prevention

2006 – 2008 University of New Mexico, School of Medicine, Department of Internal Medicine, Division of Epidemiology & Biostatistics, Immunologist/Health scientist

2008 First Fellow of the UNM HSC Clinical Translational Science Center (CTSC) Participatory Research Center

2014 - current University of New Mexico, College of Pharmacy, Research Assistant Professor
2017 – current Elected Member of the UNM HSC COP Research and Scholarship Committee
2018 - current Core Director of Community Engagement and Outreach of Mountain West IDeA Clinical and Translational Research –Infrastructure Network (CTR-IN), UNM HSC CTSC
2020 Invited Speaker and Panelist: National Academy of Sciences Standing Committee on the Use of Emerging Science for Environmental Health Decisions: Translatable and Accessible Biomarkers of Effect: From Model Systems to Humans
2019 UNM HSC CTSC Faculty Excellence Team Science Award CTSC/CTSA
2003-current Elected member of the Immunology Committee of the Hungarian National Academy of Sciences
2000 "Pro Hygiene" Award, Hungarian National Public Health Award, National Institute of Environmental Health

C. Professional Memberships, Appointments, Advisory Boards:

2014- Panel 1 Peer Review, USA Environmental Protection Agency, People, Prosperity, and the Planet (P3) Phase I
2013-2014 STAR Award Reviewer Board, USA Environmental Protection Agency, Science for Sustainable and Healthy Tribes
2013- Review Committee, National Cancer Institute –Omnibus Grant Applications in Cancer Epidemiology
2011- Review Committee, National Cancer Institute – R03 Small Grants in Cancer Epidemiology
2010-2011 Ad hoc Review Committee, National Cancer Institute – Provocative Questions in Cancer Research
2007-2008 Centers for Disease Control and Prevention – PAR 07-231 Doctoral Thesis Research grant applications in public health, contributed yearly
2004- Steering Committee Member, New Mexico Immunization Coalition, New Mexico
2001-2003 National advisor for World Health Organization on Global Climate Change and Adverse Health Effects program, Rome, Italy
1998-2006 Member of the International Society of Environmental Epidemiology (ISEE) Secretary of Central European Chapter
1998-current Member of the International Society of Exposure Analysis, served as elected Board Member in 2006-2010.

D. Peer-reviewed publications (out of >65)

1. **Erdei E,** Shuey C, Pacheco B, Cajero M, Lewis J, Rubin RL. Elevated autoimmunity in residents living near abandoned uranium mine sites on the Navajo Nation. J Autoimmun. 2019;99:15-23. doi: 10.1016/j.jaut.2019.01.006. Epub 2019 Mar 14. PMID: 30878168.
2. Scammell MK, Sennett C, Laws RL, Rubin RL, Brooks DR, Amador JJ, López-Pilarte D, Ramirez-Rubio O, Friedman DJ, McClean MD, Cohort Study Team NB, Lewis J, **Erdei E.** (2020). Urinary Metals Concentrations and Biomarkers of Autoimmunity among Navajo and Nicaraguan Men. Int J Environ Res Public Health. 2020 Jul 22;17(15):5263.
3. O'Donald, E, Miller CP, O'Leary R, Ong, J, Pacheco, B, Foos, K, Enright, K, O'Leary, M, Henderson, P, Lewis J, **Erdei E,** & Henderson J (2020). Active smoking, secondhand smoke exposure and serum cotinine levels among Cheyenne River Sioux communities in context of a Tribal Public Health Policy Tob Control Sep;29(5):570-576.
4. Roberts, M. & **Erdei, E.** Comparative United States autoimmune disease rates for 2010-2016 by sex, geographic region and race –Autoimmune Reviews, accepted on June 7, 2019, published in Jan 2020 1st issue 96 issues/ calendar year)
5. Hoover J, **Erdei E,** Nash J, Gonzales M. A Review of Metal Exposure Studies Conducted in the Rural Southwestern and Mountain West Region of the United States. Curr Epidemiol Rep. 2019 ;6(1):34-49. doi: 10.1007/s40471-019-0182-3. Epub 2019 Feb 12. PMID: 30906686
6. Ong, JJ., **Erdei, E.,** Rubin, RL, Miller, C, Ducheneaux, C. , O'Leary, M., Pacheco, B., Mahler, M., Nez Henderson, P., Pollard, KM., Lewis, J. Mercury, autoimmunity and environmental factors on Cheyenne River Sioux Tribal Lands. Autoimmune Diseases.2014, Article ID: 325461, pg. 12. doi: 10.1155/2014/325461 PMID:24864198 PMCID:PMC4017878.

Partnership Letters

New York University School of Medicine

- **Letter of Commitment**
- **Indirect Cost Agreement**
- **Scope of Work**
- **Facilities and Resources**

University of New Mexico Health Sciences Center

- **Letter of Commitment**
- **Indirect Cost Agreement**
- **Scope of Work**
- **Facilities and Resources**

NEW YORK UNIVERSITY GROSSMAN SCHOOL OF MEDICINE

George D. Thurston, Sc.D.
Department of Environmental Medicine
341 East 25th Street, New York, NY 10010

Telephone: (646) 754-9454
george.thurston@nyu.edu

March 17, 2022

Tammy Granados, Director
The Keya Foundation, Inc.
118 S. Willow Street, P.O. Box 1824,
Eagle Butte, SD 57625-1824

Dear Ms. Granados,

I am confirming my agreement to collaborate with you on the American Cancer Society grant application entitled "Cheyenne River Sioux Tribal community exposures to metals in the air". This project proposes to: 1) collect, process, and share data on exposures to ambient air metals in the Sioux Nation using a capacity-building participatory research design that locates sampling stations in and around Eagle Butte SD, employing local students to collect samples on a weekly basis for subsequent analysis; and 2) deliver to the Sioux community resources and valuable information about their airborne metal levels and potential exposures that can be leveraged to promote policies to address community risks and concerns related to air pollution, health, and quality of life.

As a Professor of Environmental Medicine and Population Health at New York University School of Medicine, I have extensive expertise in air pollution exposure assessment, while my colleague, Dr. Judith Zelikoff has considerable experience working with communities and conducting scientific outreach and translation to the public, including with American tribal populations.

Our specific contributions for this investigation will include advising the Keya Foundation and data collection participants on the scientifically sound conduct of the air sampling program, as well as in the community capacity building and dissemination of study results activities. Dr. Zelikoff will serve as a sub-study Co-Investigator, who will collaborate with Dr. Erdei of the University of New Mexico and Keya administrators in organizing and executing the community outreach and engagement activities, including data dissemination. A graduate assistant will also assist Dr. Thurston and Zelikoff in these contributions to the overall study, including the preparation and analysis of ambient air filter samples.
Sincerely,

George D. Thurston
Professor
Departments of Environmental Medicine and Population Health
New York University School of Medicine

COLLEGES AND UNIVERSITIES RATE AGREEMENT

EIN: 1135562308A1

ORGANIZATION:
New York University
105 East 17th Street, 3rd floor
New York, NY 10003-2170

DATE:10/06/2021

FILING REF.: The preceding agreement was dated 09/17/2020

The rates approved in this agreement are for use on grants, contracts and other agreements with the Federal Government, subject to the conditions in Section III.

SECTION I: INDIRECT COST RATES

RATE TYPES: FIXED FINAL PROV. (PROVISIONAL) PRED. (PREDETERMINED)

	EFFECTIVE PERIOD				
TYPE	FROM	TO	RATE(%)	LOCATION	APPLICABLE TO
FINAL	09/01/2018	08/31/2021	58.50	On-Campus	Research
PRED.	09/01/2021	08/31/2022	60.00	On-Campus	Research
PRED.	09/01/2022	08/31/2023	60.50	On-Campus	Research
PRED.	09/01/2023	08/31/2024	61.00	On-Campus	Research
FINAL	09/01/2018	08/31/2021	62.50	On-Campus	Instruction
PRED.	09/01/2021	08/31/2024	57.00	On-Campus	Instruction
FINAL	09/01/2018	08/31/2021	31.80	On-Campus	Other Sponsored Programs
PRED.	09/01/2021	08/31/2022	34.00	On-Campus	Other Sponsored Programs
PRED.	09/01/2022	08/31/2023	36.00	On-Campus	Other Sponsored Programs
PRED.	09/01/2023	08/31/2024	38.00	On-Campus	Other Sponsored Programs
FINAL	09/01/2018	08/31/2021	26.00	Off-Campus	All Programs
PRED.	09/01/2021	08/31/2024	26.00	Off-Campus	All Programs

TYPE	FROM	TO	RATE(%)	LOCATION	APPLICABLE TO
PROV.	09/01/2024	Until Amended			Use same rates and conditions as those cited for fiscal year ending August 31, 2024.

*BASE

Modified total direct costs, consisting of all direct salaries and wages, applicable fringe benefits, materials and supplies, services, travel and up to the first $25,000 of each subaward (regardless of the period of performance of the subawards under the award). Modified total direct costs shall exclude equipment, capital expenditures, charges for patient care, rental costs, tuition remission, scholarships and fellowships, participant support costs and the portion of each subaward in excess of $25,000. Other items may only be excluded when necessary to avoid a serious inequity in the distribution of indirect costs, and with the approval of the cognizant agency for indirect costs.

SECTION I: FRINGE BENEFIT RATES**

TYPE	FROM	TO	RATE(%)	LOCATION	APPLICABLE TO
FIXED	9/1/2021	8/31/2022	30.00	All	All Employees
PROV.	9/1/2022	Until amended	30.00	All	All Employees

** DESCRIPTION OF FRINGE BENEFITS RATE BASE:

Salaries and wages.

SECTION II: SPECIAL REMARKS

TREATMENT OF FRINGE BENEFITS:

The fringe benefits are charged using the rate(s) listed in the Fringe Benefits Section of this Agreement. The fringe benefits included in the rate(s) are listed below.

TREATMENT OF PAID ABSENCES

Vacation, holiday, sick leave pay and other paid absences are included in salaries and wages and are claimed on grants, contracts and other agreements as part of the normal cost for salaries and wages. Separate claims are not made for the cost of these paid absences.

OFF-CAMPUS DEFINITION: The off-campus rate will apply for all activities: a) Performed in facilities not owned by the institution and where these facility costs are not included in the F&A pools; or b) Where rent is directly allocated/charged to the project(s). Grants or contracts will not be subject to more than one F&A cost rate. If more than 50% of a project is performed off-campus, the off-campus rate will apply to the entire project.

(1) The fringe benefit costs listed below are reimbursed through the fringe benefit rate: Annuity, Group Insurance, Major Medical, Hospitalization, FICA, Workmen's Compensation, Dental Plan, Pensions, Unemployment Insurance, NYS Disability Insurance, Tuition Remission (Employee only), Travel Insurance and Disability Income Protection.

(2) The NYU Tandon School of Engineering (formerly, Polytechnic Institute) was legally integrated with New York University as of January 1, 2014. Tandon's Final All Programs F&A cost rates from 9/1/2018 to 8/31/2021 are 38.5% and 20%, for on-campus and off-campus respectively. Since the Tandon School of Engineering is integrated into New York University, for all new awards (and competitive renewals), the same F&A rates and conditions as those cited for New York University beginning 9/1/2021 on page 1 of this rate agreement will be used by the Tandon School of Engineering.

(3) New York University School of Medicine (SOM) is a separate legal entity from New York University (NYU), with their own negotiated indirect costs rates in a separate rate agreement . For subawards that are issued from NYU to SOM, the negotiated indirect costs rates for SOM should apply. For subawards that are issued from SOM to NYU, the negotiated indirect costs rates for NYU should apply.

(4) The next fringe benefit rate proposal based on fiscal year ended 8/31/2021 actual costs is due by 2/28/2022. The F&A cost rate proposal based on fiscal year ending 8/31/2023 actual costs is due by 2/28/2024.

Equipment means tangible personal property (including information technology systems) having a useful life of more than one year and a per-unit acquisition cost which equals or exceeds $3,000 through 8/31/2021, and $5,000 beginning 9/1/2021.

SECTION III: GENERAL

A. LIMITATIONS:

The rates in this Agreement are subject to any statutory or administrative limitations and apply to a given grant, contract or other agreement only to the extent that funds are available. Acceptance of the rates is subject to the following conditions: (1) Only costs incurred by the organization were included in its facilities and administrative cost pools as finally accepted: such costs are legal obligations of the organization and are allowable under the governing cost principles; (2) The same costs that have been treated as facilities and administrative costs are not claimed as direct costs; (3) Similar types of costs have been accorded consistent accounting treatment; and (4) The information provided by the organization which was used to establish the rates is not later found to be materially incomplete or inaccurate by the Federal Government. In such situations the rate(s) would be subject to renegotiation at the discretion of the Federal Government.

B. ACCOUNTING CHANGES:

This Agreement is based on the accounting system purported by the organization to be in effect during the Agreement period. Changes to the method of accounting for costs which affect the amount of reimbursement resulting from the use of this Agreement require prior approval of the authorized representative of the cognizant agency. Such changes include, but are not limited to, changes in the charging of a particular type of cost from facilities and administrative to direct. Failure to obtain approval may result in cost disallowances.

C. FIXED RATES:

If a fixed rate is in this Agreement, it is based on an estimate of the costs for the period covered by the rate. When the actual costs for this period are determined, an adjustment will be made to a rate of a future year(s) to compensate for the difference between the costs used to establish the fixed rate and actual costs.

D. USE BY OTHER FEDERAL AGENCIES:

The rates in this Agreement were approved in accordance with the authority in Title 2 of the Code of Federal Regulations, Part 200 (2 CFR 200), and should be applied to grants, contracts and other agreements covered by 2 CFR 200, subject to any limitations in A above. The organization may provide copies of the Agreement to other Federal Agencies to give them early notification of the Agreement.

E. OTHER:

If any Federal contract, grant or other agreement is reimbursing facilities and administrative costs by a means other than the approved rate(s) in this Agreement, the organization should (1) credit such costs to the affected programs, and (2) apply the approved rate(s) to the appropriate base to identify the proper amount of facilities and administrative costs allocable to these programs.

BY THE INSTITUTION:	ON BEHALF OF THE FEDERAL GOVERNMENT:
New York University	DEPARTMENT OF HEALTH AND HUMAN SERVICES
(INSTITUTION)	(AGENCY)
Kerri Tricerico	Darryl W. Mayes -S (Digitally signed by Darryl W. Mayes -S, DN: c=US, o=U.S. Government, ou=HHS, ou=FSC, ou=People, 0.9.2342.19200300.100.1.1=2001313552, cn=Darryl W. Mayes -S, Date: 2021.10.12 08:34:06 -04'00')
(SIGNATURE)	(SIGNATURE)
Kerri Tricerico	Darryl W. Mayes
(NAME)	(NAME)
Sr. AVP & Controller	Deputy Director, Cost Allocation Services
(TITLE)	(TITLE)
10/12/2021	10/6/2021
(DATE)	(DATE) 4970

HHS REPRESENTATIVE: Michael Leonard

Telephone: (212) 264-2069

New York University School of Medicine (NYUMC)
Scope of Work
PI: George Thurston, Sc.D.

Study Title: Cheyenne River Sioux Tribal community exposures to metals in the air

Dr. Thurston will serve as a PI on the NYUSMC sub-project to this overall study, which involves preparing, conducting, and disseminating the results from a two-year long monitoring program of the metal exposures in the air experienced by the Cheyenne River Sioux Tribal community in and around Eagle Butte, SD. The overall research goals of this project are to: 1) collect, process, and share data on exposures to ambient air metals in the Sioux Nation using a capacity-building participatory research design that locates sampling stations in and around Eagle Butte SD, employing local students to collect samples on a weekly basis for subsequent analysis; and 2) deliver to the Sioux community resources and valuable information about their airborne metal levels and potential exposures that can be leveraged to promote policies to address community risks and concerns related to air pollution, health, and quality of life. Dr. Thurston will advise the Keya Foundation and data collection participants on the scientifically sound conduct of the air sampling program, as well as in the community capacity building and dissemination of study results activities. Dr. Zelikoff will serve as a Co-Investigator who will collaborate with Dr. Erdei of the University of New Mexico and Keya administrators in organizing and executing the community outreach and engagement activities, including data dissemination. A graduate assistant will assist Dr. Thurston and Zelikoff in these contributions to the overall study, including the preparation and analysis of filter samples.

Facilities and Other Resources

New York University

New York University (NYU) was established in 1831 and is one of America's leading research universities. It provides students with an environment of scholars and resources that enrich the educational experience and support the faculty in the development of innovative programs. It is one of the nation's largest private universities, has among the greatest number of international students, and sends more students to study abroad than any other college or university in the United States. Through its 14 schools and colleges, NYU conducts research and provides education in the arts and sciences, law, medicine, business, dentistry, education, nursing, the cinematic and dramatic arts, music, public administration, social work, and continuing and professional studies, among other areas. NYU occupies six major centers in Manhattan, and has sites in >20 countries around the world where students can study abroad. The University's motto is a "Private University in Public Service".

NYU Langone Health and NYU School of Medicine

NYU Langone Health is one of the nation's premier academic medical centers. It realizes its trifold mission—to serve, teach, and discover—through an integrated academic culture devoted to excellence in patient care, education, and research. A key component of the broader New York University community, NYU Langone comprises the NYU School of Medicine (NYUSoM), NYU Hospitals Center, and a rapidly growing regional ambulatory healthcare system. This provides a physical, organizational, and intellectual infrastructure that ensures a unique and rich environment to foster and support research, clinical care, and education. Located in the heart of Manhattan, with additional facilities throughout the New York City area, NYU Langone is home to > 50 centers, > 20 core facilities and shared technology resources, 29 academic departments in the clinical and basic sciences, > 550,000 SF of research space, 220 laboratories, 173 ambulatory healthcare centers, and five inpatient locations: Tisch Hospital, NYU Langone Orthopedic Hospital, Rusk Rehabilitation, Hassenfeld Children's Hospital, and NYU Langone Hospital–Brooklyn. The 2019 U.S. News and World Report "Best Hospitals" rankings placed NYU Langone Health at #15 in the nation, a significant leap from #19 the previous year. NYU Langone ranked #2 in New York State and #2 in the New York metropolitan area, up from #3 in both categories in 2018.

Department of Environmental Medicine

Founded in 1947, the Department of Environmental Medicine at NYU Langone School of Medicine is one of the nation's oldest and foremost centers for research into the health effects of environmental pollution. Its faculty has expertise in a wide range of environmental problems. The Department of Environmental Medicine is both a department in the NYU School of Medicine and an institute within NYU Langone Health. The Department has recently moved the majority of its operation from Tuxedo, NY to the main NYU Langone School of Medicine campus in NYC.

Laboratory Equipment

NYU's Department of Environmental Medicine is one of the leading air pollution research centers, and has significant particle and gas pollutant monitoring equipment available for use in this project, reducing the cost of conducting the research. This includes:

PM Monitoring and Sampling: Dr. Thurston has access to an extensive array of state-of-the-art air sampling equipment for generation and monitoring of chamber, occupational and ambient exposure atmospheres and monitoring of airflows. The acquisition cost of our current inventory of monitoring and sampling equipment is approximately over 1 million dollars.

The PM samplers available for ambient air monitoring include PM10 and PM2.5 samplers and equipment for measurement of particle sizes that range from molecular clusters (<10 nm) to spray droplets (>10 μm). The measurable number concentration can be up to $10^7/cm^3$. Most of these equipment items are coupled with computers and software.

X-ray Fluorescence Analyzer

In August 2012, the X-ray Fluorescence (XRF) analyzer was added to NYU's NIEHS Center Facility Core. The XRF is extremely valuable for both quantitative analysis and exposure assessment of airborne trace metals. The XRF Laboratory is equipped with a ARL QUANT'X x-ray fluorescence spectrometer (Thermo Electron). The ARL QUANT'X contains a front-anode, Rh-target x-ray tube (60keV, 400W) as an x- ray source. A useful feature of the ARL QUANT'X is that it uses Energy Dispersive X-ray Fluorescence (ED XRF). This allows for non-destructive analysis of samples for many elements simultaneously and also conservation of sample and filter composition, which is often compromised when using Wavelength Dispersive X-ray Fluorescence. In addition, the presence of a single x-ray source tube allows for greater coupling of the tube, sample and detector and provides better count rates and detector limits in secondary target mode. Typical detection limits are in the ng/cm^2 range when analyzing air filter membranes. The ARL QUANT'X offers a choice of 7 distinct metal filter positions for use in the direct excitation mode. Detection of x-rays is accomplished with a high-performance Si(Li) X-ray detector for air and vacuum environments with 150 eV resolution at 5.9 keV, and incorporates an advanced pulse processor, a 2048 channel MCA and digital peak detector. The presence of a Light Element thin window in the detector provides greater sensitivity when analyzing samples containing elements fluorine to calcium. The ARL QUANT'X can be used to analyze a broad range of sample types including air particulates collected on filters, solids, liquids and powders, and is currently calibrated for 34 elements analyzed on five secondary fluorescers. An 10-position auto sampler allows a quick throughput of samples and minimizes time spent on preparing samples. Calibration standards for 12 elements are run during data acquisition at the beginning, middle, and end of each set. Quality control includes generation of calibration curves for each set of filters.

Particulate Matter Weigh Room

The capabilities of the Analytical Measurements Laboratory Unit of NYU's NIEHS Center were expanded by installation of a climate controlled Weigh station that meets the U.S. EPA guidelines for filter conditioning, storage, and gravimetric measurement of PM2.5 and PM10 filters. Temperature and relative humidity in the room are controlled to 21±0.5°C and 40±5% RH respectively. All filters are processed in accordance with the Standard Operating Procedure, by bar coding individual Petri dishes in triplicate, each holding one filter. Filters are scanned for automatic logging into a database with each investigator's name, project and sample ID. Filter mass (pre-weight after 24 hour equilibration) is measured on a microbalance (Model MT5, Mettler-Toledo). After exposure, filters collected for gravimetric and metal analyses, including field blanks, are equilibrated at the weighing laboratory for 24 hours. When exposed filters are weighed, net weight is automatically calculated and entered into the database. The microbalance has an internal checking system, which recalibrates the scale as needed. Additional controls include daily calibration with standards, as well as laboratory blanks and QC standards.

Air Samplers and Accessory Equipment

a) Particle Samplers: condensation nuclei counters, fibrous aerosol monitor, high volume samplers, faraday cup, Aethelometer, electrostatic aerosol samplers, real time aerosol monitors (e.g., P-Trak for nanoparticles), ambient carbon PM monitors, multi-port sequential samplers, passive DataRAMs, active DataRAM, and Harvard Impactor $PM_{2.5}$ samplers.

b) Gas Samplers: ammonia, sulfur dioxide, and nitrogen oxide analyzers, Miran gas analyzers, ozone monitors, and carbon monoxide monitor.

c) Accessory Equipment: personal sampling pumps (15), flowmeters, Magnehelic pressure gauges, rotometers, electrobalance, and cyclones for $PM_{2.5}$ particle size selective inlets.

d) PM Carbon Analyzers: EEL 43M Smoke Stain Reflectometer; AethLabs Aethalometers; Sunset Labs EC/OC Analyzer

Particle Sizing Instruments

The Exposure Assessment Unit of NYU's NIEHS Center has differential mobility analyzers (with components for scanning mobility particle sizing, SMPS), a wide range particle counter, an Electrical Aerosol Analyzer, MOUDIs, optical particle counters, cascade impactors, and a centripetal impactor. We have recently acquired a newly developed commercial instrument, the Scanning Wide-Range Particle Spectrometer, Model 1000XP from MSP Corp., to improve our capabilities and operational efficiency for the continuous monitoring of the concentration and particle-size distribution in laboratory-based inhalation exposure-response studies, as well as in field studies of ambient air quality. It combines the capabilities of previously developed instruments, including the scanning mobility particle sizer, the differential mobility particle sizer, and the single particle light-scattering spectrometer, and combines them all into a much smaller and more portable unitary instrument with built-in, user-friendly operational software for analyses and control of operational modes. This software enables on-line monitoring as well as output graphics for documentation and display. This new instrument will greatly reduce technical personnel time for monitoring and data analyses.

Computer

Computer resources include personal computers connected to the NYU network for staff and faculty. Desktop Macintosh Computers and PC's at the Department of Environmental Medicine (341 East 25th Street, New York, NY) are connected to the Internet (allowing file sharing and environmental data retrieval). All faculty and students associated with this proposal have workstations for report presentation and email. All investigators have access to email, facilitating planning and communication during execution of the study. All files are backed up daily. Statistical software available either on the network or the desktop includes SPSS, Egret, S-Plus (including SpatialStats and Environmental Statistics Modules), BioConductor, R, BRB Array Tools, WINBUGS, SeqTrial, StatXact, LogXact, EAST, Systat, Stata, PASS, Mathematica, MatLab, Visual C++, Nquery, SOLAS, Power and Precision, ArcView GIS, and other special purpose statistical software. Mathtype and WinEdt (a Windows editor for TeX) are available for statistical word processing. Additional special purpose software is also available through the Research Computing Center of the NYUSOM, the NYU Courant Institute of Mathematical Sciences Computer Facility at the Washington Square campus, and the Academic Computing Facility of the NYU Graduate School of Arts and Science at Washington Square.

Training:

The University provides strong institutional support for the research work of its junior faculty, students, and post-doctoral fellows. The structure is unique in the way that Heads of the laboratories in various disciplines are in close contact, so that the PIs can collaborate on their research. The PI's laboratory is near to all other research groups/cores. All laboratory members receive instruction and training in lab safety, as well as care and use of animals, and protection of human subjects training when required. Graduate and postdoctoral trainees also receive instruction in the responsible conduct of research. Investigators are encouraged to explore and search out their own niche.

PRIVACY AND SECURITY

NYULMC has privacy provisions that are strictly adhered to, including mandatory Security Awareness and HIPAA training of all employees from custodial staff to Administration; mandatory GCP training for all clinical trials staff which includes Protection of Human Subjects training. All staff must sign a confidentiality agreement upon employment, and NYULMC meets or exceeds all HIPAA requirements.

All staff are prohibited from keeping clinical data on their desktop computers. Instead, clinical trial data is stored on servers residing in the secured off-site data center. Transaction logs and database back up procedures allow the recreation of a clinical study at any point in time.

The Data Center's networks follow NYULMC's strict security policies to ensure the privacy and confidentiality of data, as well as guard against physical, accidental or malicious loss of data or the hardware on which it resides. For example, all desktops and servers on the network run virus protection software that protect the destruction of any data, and Network users cannot disable virus defense software.

All resources, including web, database, and file servers, are protected from outside intrusion by a firewall that blocks unauthorized access to the LAN by any unauthorized user originating from the Internet by using a sophisticated combination of secure application proxies and packet filtering. Internal network security is maintained through Active Directory authentication. Intrusion detection software is employed to scan for attempted break-ins.

Password policies prevent the use of repeat or similar passwords, and "strong" passwords are required and enforced. Three consecutive password failures cause the account to be locked out until cleared by an NYULMC IT Security Administrator. A single User ID and password is used for all server access, including file servers and database access.

Users are instructed not to disclose their passwords, and shared accounts, where two or more individuals use the same login, are never used.

HIPAA and Privacy Issues

All NYULMC staff receive mandatory training on privacy and security issues, including HIPAA regulations. All databases that contain patient or clinical trial participant information are audited for unexpected database access and data changes.

BACKUP AND RESTORE

All NYULMC servers are backed up disk-to-disk, using de-duplication technology. User-driven data restore capability is available to insure data are accessible and quickly recoverable. The data is stored on servers residing in the secured off-site data center.

DISASTER RECOVERY AND CONTINGENCY PLANNING

All data for the Data Center will reside on NYULMC servers and follow NYULMC disaster recovery procedures. All data is backed up and resides in the secured off-site data center. Backed up data is replicated to another off-site location for disaster recovery. NYULMC's e-mail system has a built-in disaster recovery feature within 30-minute failover for high availability. All desktops and servers on the network run virus protection software that protects the destruction of any data. Network users cannot disable virus defense software.

Protection of Records

All data is backed up and resides in the secured off-site data center. Backed up data is replicated to another off-site location for disaster recovery. NYULMC's e-mail system has a built-in disaster recovery feature within 30-minute failover for high availability. .

MCIT Solutions Development Resources

Within MCIT, there is a framework for application development set up with in house software developers who are proficient at developing native mobile applications, and robust software utilizing an agile software development methodology that ensures iterative and highly efficient product development.

MCIT is staffed with personnel whose skillsets are able to fulfill the full software development lifecycle. Disciplines include software development (which includes both back-end and front-end programming), solution architecture, design, digital media, business analysis, product delivery, quality

assurance, database administration, infrastructure engineering, product documentation, as well as product operations and support once it is released to market.

The MCIT Solutions Development team specializes in the analysis, development and delivery of applications and enterprise IT solutions. Included in the MCIT Solutions Development portfolio are NYU Langone's public facing websites, the atNYULMC.org portal and over 100 web-based and mobile applications that span across all of NYU Langone's missions: Clinical, Research, Education, and Corporate Services.

MCIT Solutions Development employs service-oriented architecture (SOA) is a software design and software architecture design pattern based on distinct pieces of software providing application functionality as services to other applications. This allows developers to build and re-usable components that can be leveraged in future projects. As a result, the team as a strong set of core and ever-evolving capabilities available for delivering applications. This methodology helps to future proof us during upgrade paths and allows the team to adapt to the constant landscape change, inherent to an organization that endeavors to stay on the cutting edge of the latest technology. Examples of applications developed by MCIT Solutions Development include:

- Emergency Contacts Mobile App
    - This mobile application provides NYU Langone Medical Center leadership easy access to contact critical departments and on call personnel in the case of an emergency.
- ER Wait Time Mobile App
    - This application provides real-time access to the wait times for NYU Langone's Emergency Department
- Find a Doctor
    - This application allows users to search for a physician by specialty, insurance accepted and name. This includes both a web based and native mobile application.
- Quick Connect
    - This mobile application gives Residents and Attendings easy access to each other's preferred contact method during all hours, in case any critical patient care issues arise.

03/17/2022

The Keya Foundation, Inc.
Attn: Tammy Granados, Director
118 S. Willow Street, P.O. Box 1824
Eagle Butte, SD 57625

Re: Statement of Intent to Enter into a Consortium Subaward Agreement – USEPA Community-set aside application

Application Organization: **The Keya Foundation, Inc.**

Program Manager: **Tammy Granados**

Announcement Number: **EPA-OAR-OAQPS-22-01**

Title of Application: **Cheyenne River Sioux Tribal community exposures to metals in the air.**

Funding Organization: **ENVIRONMENTAL PROTECTION AGENCY (EPA)**

Cooperating Institution: **The Regents of the University of New Mexico Health Sciences Center Cooperating Investigator: Esther Erdei, Ph.D., MPH.**

Direct Costs: $31,411 F & A Rate: 52.5%

Indirect Costs: $ 16,491 Total Direct and Indirect Costs: $ 47,902

Period of Performance: **November 1, 2022 – October 31, 2025**

The appropriate programmatic and administrative personnel of each organization involved in the grant application are aware of the agency's consortium agreement policy and are prepared to establish the necessary inter-organizational agreement consistent with that policy.

Furthermore, the Cooperating Institution certifies that statements in the application are true, complete, and accurate to the best of its knowledge and it accepts the obligation to comply with Public Health Services terms and conditions if a grant is awarded as a result of the application. The signatory below is acknowledging review and approval of these materials and is the institutionally-authorized individual to bind the University in this matter.

Authorized Officer Title, Signature

Julie Gallegos (Mar 17, 2022 14:07 MDT)

Julie Gallegos, Sponsored Projects Officer

505-272-5665, JGallegos@salud.unm.edu

COLLEGES AND UNIVERSITIES RATE AGREEMENT

EIN: 1856000642A1

ORGANIZATION:
University of New Mexico
1 University of New Mexico
Albuquerque, NM 87131-0001

DATE:12/17/2021

FILING REF.: The preceding agreement was dated 09/22/2021

The rates approved in this agreement are for use on grants, contracts and other agreements with the Federal Government, subject to the conditions in Section III.

SECTION I: INDIRECT COST RATES

RATE TYPES: FIXED FINAL PROV. (PROVISIONAL) PRED. (PREDETERMINED)

	EFFECTIVE PERIOD				
TYPE	**FROM**	**TO**	**RATE(%)**	**LOCATION**	**APPLICABLE TO**
PRED.	07/01/2021	06/30/2022	51.50	On Campus	Organized Research
PRED.	07/01/2022	06/30/2025	52.50	On Campus	Organized Research
PRED.	07/01/2021	06/30/2025	53.00	On Campus	Instruction
PRED.	07/01/2021	06/30/2025	45.00	On Campus	Other Sponsored Programs
PRED.	07/01/2021	06/30/2025	26.00	Off Campus	All Programs
PRED.	07/01/2021	06/30/2025	54.00	On Campus	Research DOD Contract
PRED.	07/01/2021	06/30/2025	29.00	Off Campus	Research DOD Contract
PROV.	07/01/2025	Until Amended			Use same rates and conditions as those cited for fiscal year ending June 30, 2025.

*BASE

Modified total direct costs, consisting of all direct salaries and wages, applicable fringe benefits, materials and supplies, services, travel and up to the first $25,000 of each subaward (regardless of the period of performance of the subawards under the award). Modified total direct costs shall exclude equipment, capital expenditures, charges for patient care, rental costs, tuition remission, scholarships and fellowships, participant support costs and the portion of each subaward in excess of $25,000. Other items may only be excluded when necessary to avoid a serious inequity in the distribution of indirect costs, and with the approval of the cognizant agency for indirect costs.

SECTION I: FRINGE BENEFIT RATES**

TYPE	FROM	TO	RATE(%)	LOCATION	APPLICABLE TO
FIXED	7/1/2020	6/30/2021	3.51		All Employees
FIXED	7/1/2021	6/30/2022	3.00		All Employees
PROV.	7/1/2022	Until amended			Use same rates and conditions as those cited for fiscal year ending June 30, 2022.

** DESCRIPTION OF FRINGE BENEFITS RATE BASE:

Salaries and wages.

SECTION II: SPECIAL REMARKS

TREATMENT OF FRINGE BENEFITS:

Certain fringe benefits are charged using the rate(s) listed in the Fringe Benefits Section of this Agreement. FICA, Worker's Compensation, Retirement, University Discounts, Health and Life Insurance, Unemployment Compensation, and Payroll Taxes are specifically identified to each employee and are charged individually as direct costs. The fringe benefits charged using the rate(s) listed in the Fringe Benefit Section are listed below:

Tuition Remission
Leave Payouts
Retiree Health Benefits
Employee Training and Services

TREATMENT OF PAID ABSENCES

Vacation, holiday, sick leave pay and other paid absences are included in salaries and wages and are claimed on grants, contracts and other agreements as part of the normal cost for salaries and wages. Separate claims are not made for the cost of these paid absences.

OFF-CAMPUS DEFINITION: An off-campus program is one that is conducted (1) in leased facilities where space related costs (e.g. rent, utilities and maintenance) are charged directly to the program, or (2) in facilities made available (at no cost) to the program by a non-University organization. Grants or contracts will not be subject to more than one F&A cost rate. If more than 50% of a project is performed off-campus, the off-campus rate will apply to the entire project.

Next Proposal Due:
Your next Fringe Benefit proposal, based on actual cost for the fiscal year ending June 30, 2021, is due in our office by December 31, 2021.
Your next Facility & Administration proposal, based on actual cost for the fiscal year ending June 30, 2024, is due in our office by December 31, 2024.

Equipment means tangible personal property (including information technology systems) having a useful life of more than one year and a per-unit acquisition cost which equals or exceeds $5,000.

SECTION III: GENERAL

A. LIMITATIONS:

The rates in this Agreement are subject to any statutory or administrative limitations and apply to a given grant, contract or other agreement only to the extent that funds are available. Acceptance of the rates is subject to the following conditions: (1) Only costs incurred by the organization were included in its facilities and administrative cost pools as finally accepted: such costs are legal obligations of the organization and are allowable under the governing cost principles; (2) The same costs that have been treated as facilities and administrative costs are not claimed as direct costs; (3) Similar types of costs have been accorded consistent accounting treatment; and (4) The information provided by the organization which was used to establish the rates is not later found to be materially incomplete or inaccurate by the Federal Government. In such situations the rate(s) would be subject to renegotiation at the discretion of the Federal Government.

B. ACCOUNTING CHANGES:

This Agreement is based on the accounting system purported by the organization to be in effect during the Agreement period. Changes to the method of accounting for costs which affect the amount of reimbursement resulting from the use of this Agreement require prior approval of the authorized representative of the cognizant agency. Such changes include, but are not limited to, changes in the charging of a particular type of cost from facilities and administrative to direct. Failure to obtain approval may result in cost disallowances.

C. FIXED RATES:

If a fixed rate is in this Agreement, it is based on an estimate of the costs for the period covered by the rate. When the actual costs for this period are determined, an adjustment will be made to a rate of a future year(s) to compensate for the difference between the costs used to establish the fixed rate and actual costs.

D. USE BY OTHER FEDERAL AGENCIES:

The rates in this Agreement were approved in accordance with the authority in Title 2 of the Code of Federal Regulations, Part 200 (2 CFR 200), and should be applied to grants, contracts and other agreements covered by 2 CFR 200, subject to any limitations in A above. The organization may provide copies of the Agreement to other Federal Agencies to give them early notification of the Agreement.

E. OTHER:

If any Federal contract, grant or other agreement is reimbursing facilities and administrative costs by a means other than the approved rate(s) in this Agreement, the organization should (1) credit such costs to the affected programs, and (2) apply the approved rate(s) to the appropriate base to identify the proper amount of facilities and administrative costs allocable to these programs.

BY THE INSTITUTION:	ON BEHALF OF THE FEDERAL GOVERNMENT:
University of New Mexico	DEPARTMENT OF HEALTH AND HUMAN SERVICES
(INSTITUTION)	(AGENCY)
Teresa Costantinidis	Darryl W. Mayes -S Digitally signed by Darryl W. Mayes -S DN: c=US, o=U.S. Government, ou=HHS, ou=PSC, ou=People, 0.9.2342.19200300.100.1.1=2000131669, cn=Darryl W. Mayes -S Date: 2021.12.29 07:07:49 -05'00'
(SIGNATURE)	(SIGNATURE)
Teresa Costantinidis	for Arif Karim
(NAME)	(NAME)
Senior Vice President Finance & Administration	Director, Cost Allocation Services
(TITLE)	(TITLE)
Dec 29, 2021	12/17/2021
(DATE)	(DATE) 7099

HHS REPRESENTATIVE: Denise Shirlee

Telephone: (214) 767-3261

CONTROLLER ADMINISTRATION

HEALTH SCIENCES
FINANCE & ADMINISTRATION

University Controller
Financial Services, Main Campus
1 University of New Mexico
MSC01 1300
Albuquerque, NM 87131

Office of the Senior Executive Officer, Finance & Administration
Health Sciences Center
1 University of New Mexico
MSC09 5300
Albuquerque, NM 87131

MEMORANDUM

DATE: January 12, 2022

TO: Faculty, Staff, Chairs, Deans, Directors, and Administrators

FR: Norma Allen, University Controller
Ava J. Lovell, Senior Executive Officer for Finance & Administration-HSC AJL

RE: New Federally Negotiated F&A Rates

Attached is the new federally negotiated facilities and administrative (F&A) rate agreement dated December 17, 2021, agreed to by UNM and the Department of Health and Human Services. This agreement is effective 7/1/21 through 6/30/25. Details of the new agreement are as follows:

The rate for On-campus research remains at 51.5% of modified total direct costs (MTDC) until 6/30/22 increasing to 52.5% until 6/30/25.

The rates for On-campus instruction is 53% of MTDC and the rate for On-campus other sponsored activities (includes public service) is 45% of MTDC.

The Off-campus rate remains capped at 26% of MTDC for all programs. Off-campus is defined as activities performed in facilities not owned by the institution and to which rent is directly allocated to the project(s) or in facilities made available (at no cost) to the program by a non-university organization. If more than 50% of a project is performed in off-campus facilities, the off-campus rate will apply to the entire project.
The rate for On-campus Department of Defense (DoD) contracts remains at 54% of MTDC. The rate for Off-campus DoD contracts remains at 29% of MTDC.

The rate for On-campus agreements with non-federal sponsors remains at 54% of MTDC. The rate for Off-campus agreements with non-federal sponsors remains at 29% of MTDC.

The approved rate for miscellaneous fringe benefits is 3.00% for Leave Payouts, Tuition Waivers and Retiree Benefits.

The new F&A rate agreement will be implemented as follows:

Effective immediately, any new proposals, newly proposed increments, supplements or new tasks that will start or extend past July 1, 2022, should use the rates in the new agreement.

For existing awards, the current F&A rate will continue to be used for the life of the sponsored agreement. "Life" as defined by Federal OMB Uniform Guidance Appendix III 2 CFR 200 means the period of years for each competitive segment of a project approved by the funding agency at the time of the award. If negotiated rate agreements do not extend through the life of the sponsored agreement at the time of the initial award, then the negotiated F&A rate for the last year of the rate agreement will be used.

If you have any questions, please contact the Office of Sponsored Projects office for Main Campus and Branches at 277-4186, or the Sponsored Projects Office for the Health Sciences Center at 272-9383.

Norma Allen

Ava J. Lovell
Ava J. Lovell (Jan 12, 2022 16:01 MST)

SCOPE OF WORK

Dr. Erdei as Co-I of the study and employed at the University of New Mexico Health Sciences Center College of Pharmacy, will perform the role of the co-investigator for the EPA ARP community air pollution monitoring study, acting as the PI for the UNM HSC subaward. The study will involve developing community educational materials about air pollution, metals in air and their possible human health effects. She will also be a main contact of the Study Team, linking academic partners and the Keya Foundation as well as the community with various outreach events and activities. She will assist NYU partner with developing outreach and sample collection training materials to train the study site student research assistants. Dr. Erdei will also carry out the conceptual organization and oversight of the community capacity planning, education input organization in collaboration with Dr. Zelikoff at NYU, the MBIRI and The Keya Foundation in South Dakota. She will also implement evaluation measures to estimate the effectiveness of the dissemination as well as data collection process evaluation. She will assist the Keya Foundation and Tribal partners with continuous monitoring and reporting of the overall effectiveness of the program and air monitoring and sampling study. Below is a summary of the activities that will take place within or through the UNM HSC study site, including information assessments and communication.

As Co-I partner in the EPA ARP community air pollution monitoring Research Team for the proposed UNM HSC sub-award, **Dr. Erdei**

- will promote the planned research project by creating and submitting EPA-required documentation and reporting.

- will assist the Keya Foundation and MBIRI colleagues in carrying out outreach and capacity building activities and all level of communication about the research project on the Cheyenne River Sioux Tribal land.

- will work closely with NYU and Keya Foundation to carry out and oversee study activities and will support the design and planning of project based on her existing study contacts, experiences in the Lakota communities and through her collaborations with the Oglala Lakota College.

- As Co-I, will assist and provide expert materials on all community-facing information (Facebook, radio shows meetings, talking circle etc.) about air pollution related chronic diseases and for all level of student education activities (Dupree HS, Timber Lake High School, Windswept Academy (middle and HS) as needed.

- will be in contact and communicate effectively with Keya Foundation management and will be the responsible organizer of the weekly meetings via ZOOM sessions.

- will work closely with NYU and Drs. Thurston & Zelikoff on training organization and deployment in the communities and education session organization in South Dakota. She will travel as needed to support events locally.

- As Co-I, Dr Erdei will participate and support Keya Foundation's efforts to brief and work with local and Tribal Council and health representatives of Indian Health Service about the study and its importance to local communities and other neighboring Lakota Tribes. She will oversee and support educational activities, and the health committees' meeting preparations about the research, promoting future public health research needs and critical information delivery to the Tribal leadership.

UNM HSC subaward PI: E. Erdei, PhD, MPH. UNM HSC COP

UNM HSC facilities

Research Space:
The Community Environmental Health Program (CEHP) is centrally located within the College of Pharmacy where Dr. Erdei is a faculty member. She has dedicated access to the CEHP 770 square feet laboratory space (Lab B41). Her 250 square feet office space is situated close to the laboratory where she conducts immunotoxicological works in the Main College of Pharmacy Building on the UNM HSC North Campus location.
The office is equipped with all necessary research and study management tools such as personal computer with statistical (SPSS, Stata and R) and office management software, laptop with camera/video option and a printer, scanner and mobile fax unit and a business conference phone line. All study documentation can be stored in her locked office safely and confidential way in locked file cabinets.

There are conference and meeting rooms available in the main building of the UNM HSC COP, where seminar rooms, classrooms and IT support are also accessible from the College of Pharmacy and from the UNM HSC if necessary for organizing educational materials, test presentations and for media communication tool development. Dr. Erdei is also one of the recipients of the six, COP-supported professional faculty ZOOM line for unlimited web- and video conferencing. The Team has been using her line for more than 3 years now for regular weekly meetings and grant development discussions.
There is a conference room available for all communication purposes within the study team and additional phone conference use in the CEHP buildings themselves (both in Stanford House and Vassar office), as well as in each of the three nearby College of Pharmacy buildings. Additional meeting and communication space is available at the centrally located UNM University Club facilities, where Dr. Erdei is also a registered member.

Dr. Erdei has wet-lab laboratory space for immunotoxicology research that was newly renovated by UNM HSC COP for the CEHP team. Within the lab Dr. Erdei has dedicated space for the proposed experimentation, serum work and data entry. The new lab space is approximately 770 square feet and contains three long double-sided lab benches, with each bench adequate to accommodate at least 4 individuals (2 per side). The equipped laboratories for this grant will fully support sample preparation for all analyses proposed in this study. A certified HEPA filtered laminar flow hood provides safe environment for biological sample handling and storage. The lab is also equipped for biochemical, molecular and cellular studies including biosafety cabinets, CO2 incubators, equipment for PAGE and Western blotting, large and small centrifuges, minifuges, dry baths, water baths, balances, refrigerator, and freezers (- 80°C) and (-20°C). Shared liquid nitrogen tanks, CO2 incubators in the College of Pharmacy building are centrally supported by the College and available for this project.

Dr. Erdei has unlimited access to platforms for cytokine multiplex assays; A Magpix bead analyzer which utilizes xMAP technology to quantitative immonoassays, complex genetic analyses, and enzymatic assays in a 96-well format. Updated software of the Analyst of Magpix analysis is available for analytical data generation. The laboratory has office space also for graduate students and postdoctoral fellows and is fully equipped for secure documentation storage and with computers, printer, and a shredder.

This laboratory is supplemented by shared equipment facilities maintained by the College of Pharmacy Department of Pharmaceutical Sciences which is the home department for Dr. Erdei. The COP maintains an array of shared equipment described below, as well as several multi-user collaborative laboratory spaces. The College has a strong initiative focused on developing team science, and encourages collaborative research among its investigators both within and across departments, and with other outside institutions, and Tribal colleges. The COP also provide structural financial support through an RFP process to develop team research in which research and Scholarship Committee Dr. Erdei is a member recommended by her Chair, Dr. Linda

Felton.

College of Pharmacy Lab Equipment available:

- GENios Mulitwell Spectrofluorometer , Tecan
- TD 20/20 Luminometer – Turner Designs, Turner Designs
- RF-1501 Spectrofluorophotometer , Shimadzu
- FTIR-830 Fourier Transform Infrared Spectrophotometer, Shimadzu
- DU800 Spectrophotometer + computer, Beckman Coulter
- 7900HT Fast Real-Time PCR System, Applied Biosystems
- IX70 Inverted Fluorescent/Light Microscope + Camera , Olympus
- Axioskop 40 Upright Fluorescent/Light Microscope + Camera , Zeiss
- Spectra Max 340 Multiwell Spectrofluorometer + computer, Molecular Devices
- Image Station 4000 MM + computer, Kodak
- Protein Simple FlourChem R with Built-in IR plus RGB LEDs, UV and white light sources
- Accuri C6 Flow Cytometry System with desktop computer and analytical software
- Vacufuge, Eppendorf
- RC 5C plus Centrifuge, Sorvall
- Optima TLX Ultracentrifuge (120000rpm), Beckman Coulter
- Gyratory Water Bath Shaker, New Brunswick Scientific
- Victor 2 1420 MultiLabel Counter, Wallac
- AS12 Accu Sterilizer Small Autoclave (3)
- Autoclave (big)
- Laminar Flow Hood (portable-animal use), ESCO
- Solar Simulator 300W
- Solar Simulator 1600W
- E-Pure Water System
- NanoDrop + computer (recently purchased new model)
- Cryostat
- Ice Machines (3)
- DU640 Spectrophotometer, Beckman Coulter
- LS6500 Scintillation Counter + computer, Beckman Coulter
- Infinite M200 Multiwell Spectrofluorometer + computer, Tecan
- Nanopure II water purifier, Barnstead
- Film developer
- BioMek NX 58 Robot + computer, Beckman Coulter
- I-cycler Thermal Cycling System (2) + computer, BioRad
- Cyrogenic Storage Freezer, Thermo Electron
- +160L Liquid Nitrogen tank
- CO2 Incubators (2 sets/doubles), Sheldon Manufacturing

UNM Computer Services:

General: UNM's Information Technology Services (ITS) provides centralized support, across all UNM campuses, for faculty, staff, and students in voice and data networks, computer and storage resources. ITS supports and manages computing environments and services such as WebCT, Portal, computer pods, departmental software purchasing at educational discounts, hardware maintenance, course evaluation and test scoring. ITS supports a centralized, university wide computer application called Banner with modules for student admissions, registration, financial aid, human resources, payroll, finance and Hyperion reporting for grants and contracts, degree audit and non-Banner applications. Finally, ITS provides and manages UNM NetID for authenticated access to all systems mentioned above, as well as email, Web services and Internet. UNM HSC Library and Informatics Center provides additional resources including remote access to ejournals and a Groupwise web access application that specifically connects HSC investigators.

Research: The UNM Center for Advanced Research Computing (CARC), directed by Dr. Susan R. Atlas, provides parallel supercomputing, high-speed networking, large-scale storage and visualization capabilities to the entire UNM research community and houses a total of about 5 Tflops/sec (peak) of computing power and just under 400 TB of storage, including a new state-of-the-art 281 TB multi-tier, RAID storage system (integrated by Hewlett-Packard). The system is designed to scale to 16 PB. Several large memory supercomputers (e.g. Nano; Pequena) connect to the storage system via a secure high-speed network. This internal network serving data to the CARC supercomputers is further connected to the central campus Core and thus to the UNM Cancer Research Facility. It provides redundant switching capabilities for high availability in connecting the storage array to CARC parallel supercomputers.

A recent NSF Major Research Instrumentation grant was awarded to Dr. Atlas from the NSF Office of Cyberinfrastructure. The grant supported the acquisition of a new general-purpose GPU (graphical processing unit)-based supercomputer, Xena; this supercomputer consists of 256 processing cores, 96 nVidia Tesla GPUs, and .5 TB distributed RAM, networked by Infiniband. The new computer joins the 32-node Nano, 16 node .25 TB shared-memory machine ('R' server) Poblano, 160-core Ristra, and 176-core Pequena parallel supercomputers. CARC provides gateway access to the Encanto machine, housed at the statewide supercomputing center, the New Mexico Computing Applications Center. The NMCAC is managed by a consortium of the three New Mexico research universities (UNM, New Mexico Tech and New Mexico State University), Los Alamos National Laboratory and Sandia National Laboratories. Encanto is a 1792-node/14,336-core SGI Altix ICE 8200 system, of identical architecture to Pequena. Codes developed at CARC on Pequena are thus easily scaled up to run on the Encanto machine on a fee-for-service basis. Encanto's Infiniband I/O network presents a 172 TB scratch space in a Lustre file system. The resources of three new machines, the 88-core Galles cluster and two 256-core NSF PRObE systems provided to UNM/CARC by the NM Consortium and Los Alamos National Laboratory, will also be available for use by this project. CARC connects to Internet1, Internet2 and the National Lambda Rail (NLR) via UNM's 10 gigabit/sec backbone network.

Other:

Instrument repair is provided through the Physics Dept. shop on a fee for service basis or for specialized equipment through vendor service contracts.

Available Core Facilities:

The Core Facilities are available to the wider UNM scientific research community. The UNM Cancer Research and Treatment Center is home to several shared resources that are unique in the state. These include a Flow Cytometry Resource with multi-color flow analyzers and cell sorters. A newly renovated Innovation, Discovery and Training Complex (IDTC) equipped with robotics and the newest instrumentation for high throughput screening. A Fluorescence Microscopy resource (developed with NCRR, NSF and NCI resources) houses four confocal and several conventional epifluorescence microscopes for fixed tissue and live cell imaging, quantitative image analysis software and workstations, fluorescence ratio-imaging equipment and digital cameras for image collection and single particle tracking. Keck Foundation funding has enabled UNM to establish state-of-the-art facilities in: 1) genomics with systems for analysis of nucleic acids, real time PCR, complete Affymetrix system for genechip hybridization and screening, servers for data storage and multiple software packages for data analysis (Keck UNM Genomics Resource, KUGR), 2) radioisotopes- a partnership with Los Alamos National Laboratory to develop medical applications from specialty radionuclides (New Mexico Center for Isotopes in Medicine), 3) small animal imaging that enables the analysis of novel imaging probes through integrated nano-SPECT/CT/PET capabilities (Keck-UNM Small Animal Imaging Resource, KUSAIR) and most recently a biomolecular imaging center for microscopic imaging at the nanometer and picometer scale. The Cancer Center Biostatistics Shared Resource (BSR) provides biostatistical collaboration and support for Cancer Center researchers, including study design, data analysis, grant preparation, such as writing statistical sections, providing power calculations, conducting background data analyses, letters of support, clinical trials: Design and analysis, and statistical methodology development. With five members, the Biostatistics Shared Resource includes expertise in a wide range of areas, including statistical genetics, high-dimensional data analysis, Bayesian statistical methods, survival analysis, general regression methods, clinical

trials and biostatistical methods in epidemiology. Clinical Protocol, Data Management and Informatics support is also available to help implement and regulate clinical trials, and providing a centralized clinical trial database, investigational pharmacy support, financial accounting, data safety monitoring and quality assurance.

Biostatistics, Bioinformatics, and Biocomputing:

University of New Mexico Health Sciences Center (UNM HSC) operates one of the 9 Molecular RoadMap Centers in the U.S. (Larry Sklar, PI) that maintains extensive staff and technical capabilities for bioinformatics and biocomputing. These investigators collaborate widely with UNM HSC faculty. The Department of Internal Medicine, Division of Epidemiology and Biostatistics maintains core faculty in biostatistics, exposure assessment, and modeling who widely collaborate with PIs affiliated with the CTSC and/or the Cancer Research and Treatment Center and are available to consult on an ad hoc or on a percent effort basis. With five members, the Biostatistics Shared Resource includes expertise in a wide range of areas, including statistical genetics, high-dimensional data analysis, Bayesian statistical methods, survival analysis, general regression methods, clinical trials and biostatistical methods in epidemiology. The team works extensively with clinical researchers; members serve on the Protocol Review Committee and the Data Safety Monitoring Committee and also collaborate on the design and analysis of clinical trials being conducted at the UNM Cancer Center. The UNM-METALS Center researchers are all affiliated with the CTSC, and many also with the CRTC, and therefore will have access to this resource should needs for biostatistics exceed those provided within the expertise of Drs. Miller, and Erdei. UNM HSC also maintains a variety of statistical suite programs that can be run for PC (e.g. SAS) and is networked to the UNM Supercomputer facilities at CARC as well as to the Los Alamos National Lab for data-intensive calculations.

Clinical and Translational Science Center

The CTSC provides numerous core facilities to support investigators. The CTSC Translational Technologies Laboratory is comprised of 6,000 sqft. of wet-lab space, located in the newly renovated UNM CTSC Building. The T-Lab offers state-of-the-art equipment and technical assistance with laboratory techniques for UNM HSC investigators. The experienced staff of the T-Lab provides specialized laboratory support, customized to meet the needs of the investigators in all aspects of research including protocol/assay development, budget preparation, and testing of patient samples for various assays. The Clinical Research Unit supports adult inpatient and outpatient and pediatric research activities. They also support a wide range of nursing and coordinator services. The Community Engagement Research Core can provide expertise in the full spectrum of the research process that supports an expansion of research with communities in New Mexico. Biomedical Informatics through the CTSC offers coordinated infrastructure that encourages innovative clinical and translational research. The CTSC Biomedical Informatics Core also houses and maintains the REDCap data management system at UNM. REDCap is an integrated data management system developed and maintained by an international consortium of researchers, including the US CTSA network. The system allows for secure and remote data entry, logs all actions by users, and ensure forward and backward compatibility across versions. The Regulatory Support Unit supports researchers through a centralized service portal within the CTSC and through collaboration with the UNM HSC Human Research Protections Office (HRPO), and can assist the investigator and research team in all stages of research from conceptualization to implementation of a clinical research endeavor.

Dr. Erdei also serves on one of the three, the HRPO-run Human Research Review Committees, a service that allows her to be updated regularly on both federal and state level law changes guiding human subject research. She also represents at the HRRC meetings a focus on Native American Tribal research perspectives and safeguarding protection of minorities in UNM HSC-supported research.

Analytical Facilities: The Trace Metals Chemistry Laboratory is located at COP Main Building in room B39. The facility is under the supervision of Profs.. Matthew Campen and Changjian Feng. The laboratory is equipped with state of the art computer controlled analytical instruments and sample preparation apparatus. It is capable of analyzing various types of samples including, but not limited to urines, and solids such as rocks,

soils, plant materials, waste, and biota. Also the laboratory performs analysis on aqueous samples such as surface, ground, and waste waters for water quality and/or discharge characterization. Solids and aqueous samples can also be acid digested and analyzed for acid and/or total recoverable trace metals determination. They also can be extracted for available elemental determinations. The laboratory is staffed with highly trained and competent personal to perform daily operations by implementing approved protocols including quality assurance and quality control (QA/QC) measures. The primary mission of the laboratory is to provide analytical services support for teaching and research programs at the Health Sciences Center Departments and to assist New Mexico Cancer Center research and to promote research for undergraduate and graduate students, staff, and faculty. The existing instruments include:

- Rigaku Wavelength Dispersive X-Ray Fluorescence Primus II ZSX (Rh 4KW X-ray tube) capable of analyzing elements (majors, minors, and halides) in solid samples with minimum disturbance (fused glass beads and/or pressed powder).
- Dionex ICS 100 and Metrohm ICs currently are being used to analyze anions in water and solids extracts samples. It has also, the capability of analyzing certain organic and inorganic metallic compounds and elements.
- Three Perkin Elmer Optima 5300DV, 4300DV, and 3000DV ICP-AES (dual view-radial and axial, simultaneous, and real time integration feature) provides a wide range of analytical capability for elemental (cations, heavy, and trace metals), phosphorus, and sulfur determinations.
- Perkin Elmer 5100 model Flame Atomic Absorption/Atomic Emission (AA/AE) equipped with Deuterium (D2) background correction capability capable of analyzing heavy matrix sample without spectral interferences.
- FIAS – 400 Hydride Generation system interfaced with the Perkin Elmer 5100 model Atomic Absorption utilizing furnace heating for analyzing volatile elements such as As, Se, Hg, Te, Sb, and Bi at low ppb or hi ppt concentrations.
- HITACHI U-2000 programmable Spectrophotometer is being used for single and multi wavelength (WL) scans for spectral characterization. It can also be used for any colorimetric determinations.
- Mitsubishi automatic programmable titrator provides fast and accurate measurements of any analysis that requires titration such as alkalinity in water samples.
- New Wave Laser Ablation 213 nm system including CryoCell for analyzing biota samples. The laser, including the CryoCell, can be coupled with either the Perkin Elmer Optima 5300DV ICP-AES and/or the NexION 300D ICP/MS.
- NexION 300D ICP/MS used for trace analysis, can be coupled with the Flexar HPLC for elemental speciation, and to be coupled with the New Wave UP 213 Laser Ablation system for solid and biota (CryoCell) analysis.
- Flexar HPLC for elemental speciation when coupled with the NexION 300D ICP/MS. It is also coupled with electrochemical detector for food (FDA), drug (pharmaceutical), pesticides and herbicides.
- FIMS mercury analyzer for trace level Hg analysis.

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